Students' perceptions of learning through assessment for learning and technology.

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Abstract

This study investigates the implementation of the concept of assessment for learning in the context of computer education courses in teacher education in Macau. It aims to promote reflection in students' learning with the use of technology. The concept of assessment for learning was infused into the courses taught by the researcher. Opportunities for self-assessment, peer-assessment and constructive feedback were set up for students to examine their own learning through the online technology, of blogging and digital portfolios. One hundred and seventeen teachers and teacher candidates, taking Computer Applications, Educational Technology and Information Technology in Education experienced a curriculum based on the concept of assessment for learning for a period of thirteen to fourteen weeks. Nineteen of them experienced a longer period of about twenty-seven weeks. Students were requested to reflect on the course content weekly using blogs and the journal content of the blogs serves as the main source for data analysis. In addition, a questionnaire was given to students to seek their view on the use of blogs for reflection and communication purposes.

Analysis of data from different sources such as questionnaire, students' journals and their digital learning portfolios show that students do engage in the reflective process. However, the quality of reflection for most students was not deep. Students did make use of the journal to communicate with the tutor. The communication pattern of students using online environment shows that they support their peers by words of encouragement, affirmation and empathy. Students value the feedback provided by both the tutor and their classmates. Major problems encountered by students are: the requirement to write a weekly journal and knowledge of what constitutes reflective journal content. The study concludes that assessment for learning is a viable approach that can be supported through blog and digital portfolios. However, the successful implementation of the assessment for learning requires the active facilitation of the tutor to engage students in the process of reflection and communication.

Contents

List of Tables

List of Figures

Chapter 1. Introduction

This thesis aims to study the implementation of the concept of *assessment for learning* through technology of blog and digital portfolio in the computer courses in the context of teacher education. This chapter outlines the background of the study. It includes the information technology context, the assessment notions of teachers and parents, the teacher education program in Macau. The importance of reflective thinking to learning is presented. Then the purpose, the scope and the importance of the study are listed. An overview structure of the thesis ends this chapter.

1.1. Background: Information technology in Macau

In order to increase competitiveness in the global world after the 1999 transition from Portugal to China, the Macau Government emphasizes the need to boost information technology (IT) in education and society so as to raise the IT literacy and the overall education of Macau citizens. Since then, the Macau Government has launched a number of major initiatives[1] to achieve these goals:

- Allocate budget for general education purposes to buy computers and related equipment;
- Allocate budget for the training of teachers to become computer literate;
- Organize trips for school principals to learn from the nearby regions, e.g. Singapore's IT experience;
- Collect and organize educational resources related to IT to help teachers use IT in teaching and learning;
- Set up IT kiosks in educational centres or pubic libraries for citizens to use;
- Support organization of IT conferences and exhibitions every year to promote dissemination of IT in schools;
- Support and conduct research related to IT in education which serves as evidence

[1] Policy address of Chief Executive of Macau SAR http://www.gov.mo/egi/Portal/rkw/public/view/showcomp.jsp?id=CategoryMain&cid=c373e9fdbc5df13b8f6b8e2b43a22d85

in support of further development strategies;

- Encourage teachers to develop computer-based teaching materials.

With the support of the government and local commercial companies, the awareness of IT literacy among Macau citizen has been raised. In addition, IT provisions and infrastructure in schools improved a lot in the past years. A recent survey conducted by Cheong and Wang indicated that in 2003 the number of people using the Internet was 162,000 and this number soared to 201,000 in 2004 (Cheong and Wang 2004; 2005). Percentage increase within a single year amounts to 24 percent. These figures are not small if one realizes that the population of Macau is only 465,333 (The Statistics and Census Service 2004). In 2003, about 25 per cent of Internet users were aged between 6 and 18. In 2004, use by the same group rose to 30 percent. This figure provides a clear message that IT is becoming a part of the everyday lives of the Macau's citizens, e.g. for leisure and communication.

On the other hand, the development of the IT curriculum in Macau is still lagging behind. Even though the IT curriculum is now introduced at all levels of education from early childhood to high school in Macau, the IT literacy standard of high school graduates are not the same. Some students might know a lot of computer skills and knowledge while some students might just know basic things. One of the reasons to explain this situation is because of the laissez-faire type of IT curriculum in Macau. More than 90% of schools in the basic education of Macau are private. This implies that the government has little control or surveillance over the curriculum. Every school has its own policy and priority to develop IT in school. Some schools might emphasize students' general ability like computation, analysis and logical developments. On the other hand, others might just require their graduates to know the basic operations which meet the demand of commercial society. Depending on the policy of each school, some schools with better resources introduced computer studies as early as the late 1980s. Hence, graduates from these schools might have good knowledge of computers.

Another reason is due to the novelty of computer education. This subject is a new one. Even in the most developed countries like United Kingdom[2] and Singapore[3], it was

[2] National Curriculum online http://www.nc.uk.net/nc_resources/html/download.shtml

only within the last 10 years that computer education was included in the core subject of the basic education. These countries had set up their goal and framework with respect to IT developments. The effects of IT policy are still under researched. Therefore it is a new subject without any good model to follow. Computer books offered by publishers are the only choice for teachers in Macau to adopt. But these books are mostly about the operation of the computer and its application software. There are few books in the markets which explain the rationale of computer education with respect to children. Besides, schools in Macau are likely to assign teachers with computer education certificate to teach this subject. These teachers who are not graduated from teacher education program have little knowledge of curriculum design or the pedagogical knowledge required to teach about the computer. This is an explanation of why most schools opt for IT applications linked with the readily available commercial software. Many schools emphasized IT applications which meet schooling and career demands. The IT curriculum was not designed to be developmentally appropriate for students' needs and interests let alone creativity and higher-order thinking skills. As a result of this curriculum implementation approach, many IT courses are skill-based, paying attention to the familiarization of the functions of commercial software and input methods. It seems that the only goal of computer education is for students to be skillful software users (Chan and Cheung 2005).

High school graduates in Macau have a certain number of years of IT studies in their basic education. One might expect each to be a confident user of computers. However, the difference in school resources, different experience of learning IT curriculum and students' social background generate students with a variety of computing skills, knowledge and attitudes when they enter the teacher education program.

1.2. Research context

1.2.1 Teacher education in Macau

The University of Macau is the main teacher education provider of primary and pre-primary teachers in Macau. The Bachelor of Education program lasts for four years

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[3] Master plan for IT in education http://www.moe.gov.sg/edumall/mpite/overview/index.html

for teacher candidates while in-service teachers study for five years. The number of teachers graduated yearly in these two programs is about 100. One of the aims of this program is to foster teachers' reflective thinking so that they can meet the challenge of the local educational reform. Even though reflective capability is emphasized as an objective of the program, there is no specific guideline on how to achieve it as a faculty policy. Therefore, the cultivation of reflective capability of teachers depends on the teaching philosophy of individual teacher educators in the program.

As far as information technology is concerned in this program, there are only a few courses which aim to enhance teacher candidates' knowledge and ability of information technology and related development. The goals of these courses are to prepare teachers to become confident users of technology and to apply new technology in their daily learning and teaching environment. However, the researcher being a lecturer in University of Macau teaching computer related courses for several years faces a challenge that students in these courses vary greatly in terms of their knowledge and attitudes towards computers and technology. For instance, students seem to lack confidence in their computer competence; some even do not like computers or are afraid of computers; students do not use computers frequently let alone apply what they have learnt in school to their daily life. Although it is noted that students have different learning styles and abilities, the great variation in students' background, computer knowledge and attitudes affects the progress of the researcher's teaching. This in turn affects the quality of students' learning with respect to the new technology. This phenomenon caught the researcher's attention, and drew attention to the need to look for means to address the situation.

As reported in the previous section, high school graduates in Macau seem to achieve different standards. Students in the Bachelor of Education program are graduates from schools all over Macau. How should the researcher adjust the pedagogy so as to improve the learning of students? One of the approaches is to understand students more in to order to provide an appropriate instruction which suits their needs. Assessment plays an important role in this process of communication. Assessment is 'a process of reasoning from evidence'(National Research Council 2001). Evidence of students' learning should be collected to provide a basis for reasoning about their learning progress. How might technology assist in collecting evidence about students' learning?

How might it enhance conditions of learning? Current technologies such as online blogs and digital portfolios are explored as means to obtain information about students' learning and to facilitate their learning. A blog is a personal webpage which lists the blog owner's ideas chronologically. Readers can respond to the blog owner using the built-in function of feedback. Writing learning journals using blogs might disclose students' learning progress to multiple readers. Readers' responses might be a valuable feedback to their learning as well. Blogs and blogging will be discussed in detail in Chapter 3.1. A digital portfolio is an electronic filing cabinet which enables students to keep their learning evidence of a variety of formats together. In other words, students can integrate and review their learning when producing a digital portfolio. The details of digital portfolio will be given in Chapter 3.2.

The cultivation of reflective thinking is the goal of the current study because it is one of the goals of the Bachelor of Education program. Besides, reflective thinking seems to facilitate learning as reported by the Learning and Skills Research Centre (2004). Reflective thinking is a stepping stone for students to develop their meta-cognitive knowledge and skills. It enables one to monitor and review one's thinking to improve performance. The following section addresses the importance of reflective thinking to learning from existing literature.

1.2.2 Importance of reflective thinking to learning

In the current information and knowledge society, there is too much information for any one person to know and grasp. People are facing the problem of information overload, so selecting relevant information to process is necessary. The ability to discern information critically becomes a required literacy in digital society. Besides, everything is changing so fast that everyone is facing an uncertain, virtual and complex environment. How can one meet the challenge of the new environment? Dewey (1933) pointed out the importance of reflective thinking in learning. Possessing reflective thinking frees us from 'purely impulsive or purely routine action'. This means that engaging in reflective processes might generate new and innovative action. Moreover, it enables us to develop materials or think of ways to secure ourselves in the face of an unfavorable situation. It provides an opportunity for us to confer a 'different value' for the same object or event.

Reflective thinking also allows us to review and correct our own belief systems (Mezirow 1990). Mezirow believes that learning is the process of re-interpretation of the meaning of an experience. This process allows us to guide the developing understanding, appreciation and action of the experience. For example, some students used to think that they are not interested in the computer. If they reflect on their experience of having computers, they will query the how-to and the reason of their current belief. They might start working with computer in another perspective and revise their assumptions later on.

Leung and Kember (2003) reported a close association between approaches to learning and reflective practice. In their study, they borrowed ideas from the work of John Biggs in the area of student learning. Learning was categorised as adopting a surface approach or a deep approach. Students adopting surface approaches to learning focus on the surface aspects of a task rather than seeking for the underlying meaning of the task. They tend to memorize rather than to understand. They consider different aspects of a task as discrete rather than a whole. The study of Leung and Kember (2003) found that students with surface approaches to learning were likely to behave in an habitual and routine manner while those with the deep approach to learning adopted different stages of reflection like understanding, reflection and critical reflection. The study suggests that the cultivation of reflection might contribute to students' learning.

The Learning and Skills Research Centre (2004) published a report about the meta-analytic studies of thinking skills. The pedagogical approaches emphasizing thinking skill were studied. It found that such approaches were very effective with children and young people. That is such approaches enhance students' learning and thinking. However, evidence in the post-secondary levels was not strong enough to substantiate the claim. They suggested exploring pedagogical interventions improving thinking in teachers using face-to-face or distance learning approaches. Reflection and its related issues will be discussed in Chapter 2.1

1.2.3 Assessment in Macau education

Due to historical reasons, Macau, a special administrative region of China, had no

official curriculum until the 1990s. There is no public examination in Macau to serve the purpose of quality assurance. This implies that schools in Macau have high autonomy in school curriculum. In practice, schools usually adopt textbooks from Hong Kong, Taiwan and mainland China as teaching material. Preparation for students to take the university admission examination in these regions is one of the main reasons for the adoption of textbooks. Schools with English as a teaching medium also prepare students for external examinations like General Certificate of Secondary Education (GCSE), General Certificate of Education (GCE) and Teaching of English as a Foreign Language (TOEFL). Morrison and Tang (2002) described assessment in Macau as "overwhelmingly construed as testing". Their comment was supported by many teachers and teacher educators in Macau. Despite the fact that Macau has no public examinations, students are often required to take tests frequently. This is because the performance of students in the university admission examinations or external examinations is often considered by schools as an indicator of the success of the school. It is in turn an indicator of the teacher's effectiveness.

From the viewpoints of teachers, students and parents, assessment seems to equate to the concept of test and examinations which serves the purpose of grading students. In a recent study of the assessment procedures in Macau with a sample size of 113 teachers, Morrison and Tang (2002) found that tests and examinations dominated the kinds and amounts of assessment and hence the curriculum. There is a lack of awareness of other forms and amounts of assessments. Even though the disadvantages of tests and examinations are recognized, teachers do not feel their lack of knowledge of other forms of assessment to be problematic. Morrison and Tang (2002, p.293) found out that 'notions of authentic assessment, portfolio assessment, open-ended assessment, ipsative and facilitated self-assessment, and assessment other than by testing have little currency in Macau'.

Assessment might be both friend and foe for students' learning (Black 1998). It depends on how assessment is being perceived. In fact, assessment serves multiple functions. Data collected might provide information for teachers to plan instruction which suits students' needs more. It might inform parents about their child's progress. It is also used as evidence for schools to make decisions about students' promotion or retention. Schools might base on the data to make judgements of teachers' effectiveness. Among

these functions, assessment data employed for the purpose of improved instruction facilitate students' learning. In a recently established educational law[4] of Macau, the purpose of assessing students is clearly stated as to enhance their learning. Besides, multiple assessment schemes are outlined. Even though changes in purpose and format of assessment are proposed by the government, different stakeholders in the education system seem to be unaware of the shift in the focus of the idea of assessment. Morrison and Tang (2002) suggest that it is necessary for teachers to have the knowledge and understanding of designing, conducting and utilizing alternative forms of assessment. The function of assessment for certification is well known to people while the notion of *assessment for learning* needs to be promoted to students, teachers and parents.

As a member of the teacher education community in Macau, the researcher has a responsibility to nurture in teacher candidates the concept of *assessment for learning*. *Assessment for learning*, in its simplest meaning, refers to both teacher and students using evidence collected from assessment tasks to support student's learning. The detail of *assessment for learning* is discussed in Chapter 2.2. Besides, fostering reflective thinking of teacher candidates might be a possible solution solving the great variations of students' knowledge and attitude towards learning computer use, as mentioned earlier in the importance of reflective thinking to learning.

1.3. Purpose and scope of the study

Students acquire computer knowledge starting from basic education level but the researcher faces the problem of great variation in students' computing knowledge and the phenomenon that many students are unaware of the link among their computer knowledge, their learning and daily life. In order to address the problem, the goal of the study is to foster students' learning and reflective thinking through assessment and technology.

The main research areas for this study are: *assessment for learning*, reflective thinking in the process of learning and the use of tools like online blogs and digital portfolios. The study focuses on the literature about the implications of *assessment for learning*

[4] Educational Law of Macau
http://www.dsej.gov.mo/~webdsej/www/dsejnews/2006/edu_comment/index.htm

and reflective thinking. The implications from these areas are to be applied in the context of teacher education in Macau. The implementation is based on two emerging tools called online blogs and digital portfolios. The reasons for the use of technology are partly due to the context of the study and partly due to the fact that technology does play an important role in the facilitation of *assessment for learning* and reflective thinking. It is hoped that the study advances the knowledge in the area of *assessment for learning*, reflective thinking and technology.

1.4. Significance of the study

The value of conducting the current study is not limited to students only. It is also valuable for the professional development of the researcher. The significance of the study can be grouped into:

Teaching implications and student benefits - Participants in the study experience assessment practices based on the purpose of *assessment for learning*. The practice of alternative assessment will prepare teacher candidates for the concept of *assessment for learning*. It might benefit the educational reform in Macau because one of the educational reform directions is towards the concept of *assessment for learning*. This implies that students are given opportunities to reflect on their learning, and the instructor will actively access students' learning and provide appropriate instruction accordingly. The digital portfolios submitted by students might be used as a strong evidence to show their capability.

Personal benefits – The study provides a way for the researcher to examine and improve her current teaching systematically. The data collected through the blog allows the researcher to reflect and revise instruction. Digital portfolios produced by students serve as a teaching resource to the researcher. New students can refer to the digital portfolio as a concrete example of the kind of activities or knowledge that they are going to learn. It should be helpful for future teaching.

Research implications - This study contributes to existing knowledge in several ways. Firstly, it enriches the field of *assessment for learning* in the Asian teacher education context. Since most of the existing literature comes from the West, it will be interesting

to see if and how the ideas work in a different culture. Secondly, it fills the gap of lack of empirical research in the area of the *assessment for learning*. Thirdly, it provides an empirical research in the learning potentials of blogs. Finally, it also fills the gap of lack of empirical research in the area of digital portfolio assessment (Barrett 2004).

1.5. Organization

This chapter outlined the background, context and nature of the study. It states the reasons and some potential contributions of conducting this research to the educational theory and practice. Chapter two provides a review of existing literature in the area of the study. Two major themes are discussed: reflective thinking and assessment. Chapter three provides the details of tools needed to implement the concept of *assessment for learning* based on the principles of social constructivism. Chapter four outlines a systematic approach for conducting the study. Chapter five presents and analyzes the findings from the data collection tools, namely questionnaire, blog and portfolio. Chapter six concludes the thesis with a summary of results, an exploration of implications and suggestions for future study.

Chapter 2. Literature review

This chapter provides an overview of two main concepts used in the study, namely: reflection, and *assessment for learning*. It begins with a background account of reflection in learning and then proceeds to the approaches for facilitating reflection in learning. The second part is about the roles of assessment in learning. The concept of *assessment for learning* is argued to have an important role in facilitating students' learning. Finally, the chapter ends with a theoretical framework of using the concept of *assessment for learning* to foster the reflective thinking skills of learners.

2.1. Conceptions of reflection in Learning

The notion of reflective thinking in learning is not a new one. As early as the beginning of 20th century, John Dewey argued for the need to foster reflective thoughts. Dewey believed that the function of reflective thought was to 'transform a situation in which there is experienced obscurity doubt, conflict, disturbance of some sort, into a situation that is clear, coherent, settled, harmonious'. (Dewey 1933, p.100-101) He deemed the process of reflective thoughts as educative. In teacher education context, Schon (1983; 1987) also argued that teachers should be engaged in reflection in their practice. The act of reflection might free them from their routine behaviours. Darling-Hammond and Snyder (2000) even stated that it was imperative for teachers to be reflective in their teaching so that they were capable of managing complex teaching contexts. Nowadays, in a rapidly changing, information rich and technology based society, the need to possess this reflective capability can be considered to be a basic necessity to survive. Therefore, the notion of reflection has attracted lots of attention in professional areas such as teacher and nurse education for the last 20 years (Morrison 1996).

Despite the popular advocacy of reflective practice, it becomes problematic as well because of the various interpretations that have been placed on it. Morrison (1996) found that the notion of reflective practice was a term referring to various meanings like action research, professional development, the linking of theory and practice, and personal, social and political emancipation. The variations in these interpretations

generate problems in the reflective practice. Boud and Walker (1998) identified problems such as recipe following, reflection without learning, intellectualizing reflection and excessive use of teacher power. Recipe following is the practice of applying a reflective model mechanically without knowing its underlying meaning. Reflection without learning refers to those activities in which reflection is taken place but learning is not. Intellectualizing reflection is the act of separating emotions and feeling from reflection. It is necessary to understand the nature of reflection and its characteristics first before proceeding to facilitating approaches of reflective thinking.

Various meanings for the term 'reflection' and 'reflective thinking' are drawn on the literature. Reflection is not a pure concept but is multi-faceted. Dewey (1933, p.6) defined reflective thoughts as 'active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion on which it tends'. From this definition, a person who possesses reflective thoughts usually undergoes a conscious, intentional and voluntary effort in the process of systematic inquiry to look for connections and links between the parts of an experience. The process of reflection begins with a sub-process of doubts first and then follows by an investigation of seeking for facts which serves to support or reject a belief. Dewey considered that reflection involved an integration of attitudes and skills; neither attitudes nor skills alone will be sufficient. The attitudes are whole-heartedness, open-mindedness, responsibility and directness. Another characteristic of reflection endorsed by Dewey is the act of sharing and communicating. It is through these acts that one is able to extract meaning from experience.

Mezirow (1981) applied the framework of Habermas to build a reflectivity model in the field of adult learning. He classified reflection into different forms with emphasis on the role of critical reflection in adult learning. He defined reflection as awareness of a specific perception, meaning, behaviour and habits of seeing, thinking and acting. At the basic level, reflection appears in different dimensions like affective reflectivity, discriminant reflectivity and judgemental reflectivity. Each focuses on different aspects of reflection. Affective reflectivity refers to the awareness of how one feels about a specific perception. Discriminant reflectivity refers to the assessment of the efficacy of one's perception. Judgmental reflectivity is the awareness of making value judgements about perceptions, meaning and behaviour. Critical reflection involves other forms of

reflection like conceptual reflectivity, psychic reflectivity and theoretical reflectivity. Conceptual reflectivity is the awareness of concepts used to understand or judge. Psychic reflectivity is the awareness of interests and anticipation which influence the making of judgement based on limited information. Theoretical reflectivity is the awareness of the reason for making judgement based on cultural or psychological assumptions. This model of reflection has been applied to develop an instrument to measure reflection (Kember, Leung et al. 2000).

Schon (1983;1987) suggested that reflection might bridge the gap between theory and practice. He argued that when a practice became more repetitive and routine, the practitioner tended to have more tacit, spontaneous and automatic knowledge and action. This habitual knowledge and action might blind the practitioners from solving new problems. It is only through reflection that one can arrive at new insights to cope with uncertain situations. He suggested practising reflection *in* action and *after* action. His concept of reflection has been accepted widely in professional arenas like teaching, nursing and medicine. However, his concept was also criticized for not including the social context environment in which the power of peer collaboration might also contribute to reflection (Kim and Lee 2002).

Boud (1994) extended Dewey's concept of reflection in the context of learning, and with an emphasis on the role of affect in reflection. His notion of the reflective process is slightly different from Dewey's. He suggests re-collecting the experience and re-evaluating it no matter if there is any doubt or not. Reflection is a form of response of the learner to experience. He emphasized the affective aspects of learning from the perspective of a learner. In the process, one is engaged in reflective thinking with intention and consciousness. It involves both intellectual and affective activities in which learners engage to explore their experience in order to lead to new understandings and appreciations. It is an active process of exploration and discovery which often leads to unexpected outcomes. It is difficult to be precise about the nature of the reflective process because processes during reflection are integral to one another. For the purposes of serving as a model of promoting reflection in learning, important components of processes in reflection were captured and suggested as returning to experience, attending to feelings and re-evaluating experience. The model provides suggestions to learners and teachers on how to plan for the reflective stage of the

learning process.

King and Kitchener (1994) described the epistemological assumptions of reflection as the Reflective Judgemental Model. Reflective thinking involves identifying the facts, formulas and theories relevant for solving ill-defined problems. They believed that reflective judgment was a developmental progression. They identified three stages of reflective judgment as pre-reflective thinking, quasi-reflective thinking and reflective thinking. The reasoning at the first stage is gained either by direct, personal observation or through the word of an authority figure. It is assumed that knowledge gained is absolutely true and certain. In the middle stage, people recognize knowledge as uncertain. It is contextual and subjective. In the final stage, knowledge is constructed and understood in relationship to the context in which it is generated. Beliefs are justified within a particular context from different perspectives.

As a summary, the above descriptions provide different notions of reflection from various perspectives like process, learning, critical theory, practice and epistemology. Dewey is acknowledged for the contribution of stating that reflection is a cycle of active inquiry taken by learners to look for evidence when making judgements. Mezirow's reflective model depicts various forms of reflections that occur in a reflective process. He points out that different issues like personal interest and anticipation, cultural and psychological assumptions, should be taken into consideration during reflection because they affect the quality of reflection in certain way. The work of Dewey and Mezirow provides an orientation for fostering reflection. The importance of reflection in action and after action is the contribution of Schon. Boud's notion of reflection is acknowledged because of his emphasis in the context of learning. The essence of Boud's model is that learning from experience can be enhanced through both reflection-in-action and reflection-on-action. Boud's model of reflection is taken from the viewpoint of a learner with special emphasis on the learning experience and the reflective process. King and Kitchner offer a framework of reflective quality from the theory of knowledge. Their viewpoint suggests that reflective thinking is developmentally and progressively established.

Even though the above notions of reflection are drawn from different perspectives, they do not interfere with one another. Instead they are complementary to one another.

Boud's model of reflection seems to be more appropriate to apply in a normal classroom environment due to its simplicity and detailed specifications. The next section describes in detail Boud's model of reflection as it serves as a framework for the current study of facilitation of reflection.

2.1.1 Boud's model of reflection in learning

Boud's model of reflection (1994) assumes that learning is rooted on previous experience and learners are actively engaging in the process of learning from experience within the learning milieu. The learning milieu is the social, psychological and material environment in which the learner is situated. The model is divided into three stages of engagement in a learning event namely activities and experiences prior to the event, during the event and those which occur subsequently.

The first stage is prior to the experience. In this stage, attention is focused on three areas: the learner's intention and previous experience, the leaning milieu and the skills or strategies needed for the event. The second stage is the learning experience itself. The learner interacts with the learning milieu through noticing, intervening and reflection-in-action. *Noticing* refers to the awareness of what is happening while *intervening* is the action taken by the learner in response of the event consciously. *Reflection-in-action* is the process of working with noticing and intervening to construe the events and effects of the intervention. The final stage of the model is the reflective process. This process is what Schon refers to as *reflection-on-action*.

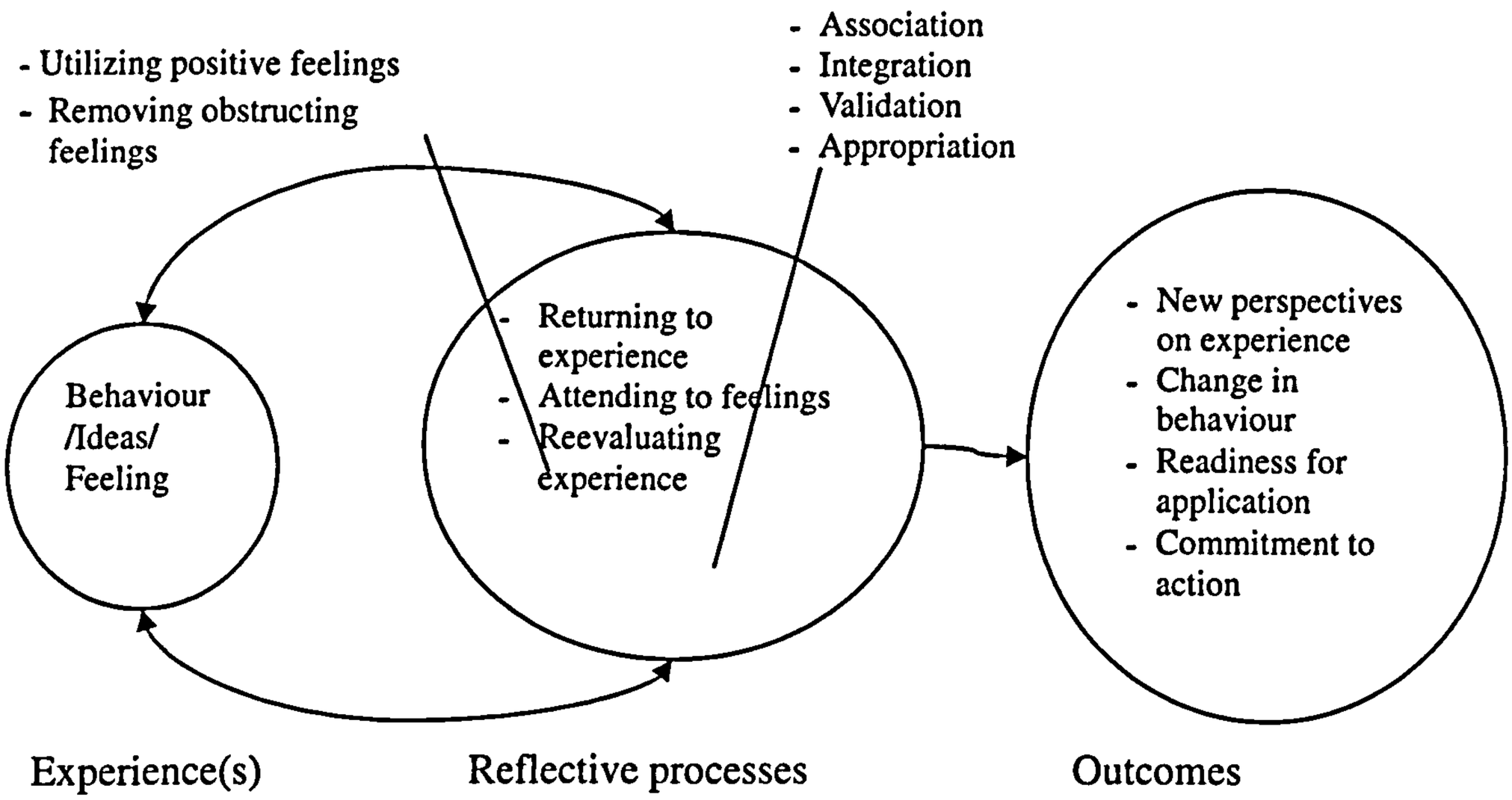

Figure 2-1. Boud's model of reflection in learning

Figure 2-1 shows Boud's model of reflection in learning. There are three sub-processes in the reflective process. *Returning to experience* is the recollection of events that have taken place. It might appear in the forms of replaying the experience in the mind of the learners or the recounting of experience to others. The process initiates a period of reflection. It provides an opportunity to reconsider and examine the ignored or only noted experience. It allows one to realize the feelings and the reasons of responses. This information ensures that reflection is based on the actual events. *Attending to feelings* is the second phase of reflection. Emotions are both the facilitator and barrier to learning depending on the nature of positive and negative feelings respectively. Therefore utilizing positive feelings provides the basis for new learning. Removing obstructing feelings helps to settle problems. These are the two issues addressed in this phase. The previous two phases help to minimize the possibility of false assumptions or reflecting on information which lack comprehension occurring. Re-evaluating experience follows. There are four aspects in this process. They are *association, integration, validation* and *appropriation. Association* is the relating of new data to previous data. *Integration* is seeking relationships among the data. *Validation* is the determination of the authenticity of the data and *appropriation* is making knowledge as one's own. While reflection is a process of experience, it also generates outcomes. They include new ways of doing things, having new insights or solving a problem. The integration, validation and

appropriation of knowledge are both the outcomes and the components of reflective process.

As a summary, reflection as conceived by Boud is a form of learning which involves an active response to experience. Responses of learners occur at different stages of experience with different emphasis. For instance, before the experience, learners' intention is focused while the awareness of the experience is noted during the experience. In the process of reflection, the learner actively seeks meaning from the experience. Besides, sharing and communicating the experience with self and others are also important aspects of reflective practice.

2.1.2 Approaches to facilitate reflection in learning

As mentioned in previous section, reflection is a conscious and active investigation, constructing meaning from experience. Developing a habit of reflective thinking requires time, skills and attitudes. It also depends on a number of contextual issues. Reflection is an uncommon activity in everyday life. People do not use reflective thinking spontaneously. One of the reasons to explain this phenomenon is that the conscious system in human brain has limited power to handle the information (Gelter 2003). However, evidence has been found that reflective capacity can be gained if reflective practice is provided (Garmon 1998; Langer 2002).

In order to foster reflective thinking, teacher educators have designed a variety of activities to promote reflection. These activities include examining case studies or critical incidents (Griffin 2003), debriefing activities, action research, compiling portfolios (Harland 2005), autobiography (Brown 1999) and semantic mapping(Lim, Cheng et al. 2003); all have been applied in field studies. With the influence of technology in education, studies to promote students' reflection and interaction have applied Internet technology such as email (Garmon 1998) and online discussion groups (Maor 2003). The most common way found in teacher education literature to promote reflection is the use of journal writing (Morrison 1996; Heath 1998; Todd, Mills et al. 2001; Langer 2002; Spalding and Wilson 2002; Schweiker-Marra, Holmes et al. 2003; Eldon 2006). Each method has its own features to support reflection which suits a particular context. These methods share the feature that opportunities are provided for

students to return to their own experiences and focus on events meaningful to them from the alternative ways of viewing the situation. For instance, the study of Grossman and Williston (2001) suggested that teacher candidates should reflect on self, students, content learning, pre-professional teaching experience and popular issues as the basis for connecting reflective thinking to practice.

2.1.3 Analysis of studies to promote reflection

In this section, brief accounts of eight empirical studies on facilitation of reflection in higher education are presented in chronological order. After that, a discussion and analysis of these studies are given in terms of research contexts, sample size, time, data sources, approaches of reflection and findings. The analysis provides guidance for the design and implementation of this research study.

Garmon (1998) invited 22 students to write dialogue journals for one semester using email. A dialogue journal is a journal in which students share a topic of interest with the teacher for an extended period of time. Students were encouraged to ask questions and were expected to respond to their instructor's questions. The grading of the journal was based on completion instead of the journal content. That is, if a student submits the journal, full mark will be given. Analysis of students' journals revealed that students learn through three ways: self-reflection, instructor comments and instructor challenge. It seems that quiet and conscientious students benefit from the process associated with dialogue journals. Garmon found that some students struggled to write journal entries. This may be due to the frequent entries requirement (Heath, 1998). Even though he endorsed the point that dialogue journal facilitated communication between tutor and students, the process was time consuming to provide quality feedback so the number of weekly journal entries was reduced from 2 to 1. This research confirms the value of dialogue journals for promoting reflection. Journal writing helps the instructor to know students better and provide appropriate instructions to students. It also points out the limitation that the process of writing dialogue journal is time consuming.

A second approach is the use of autobiographies conducted by Brown (1999). Brown provided a list of questions to prompt students about their experience of reading and writing. Eleven prospective English teachers wrote their literacy autobiographies. Their

autobiographies were used as a common text in class to promote reflection. Even though the text in autobiographies did not illustrate signs of critical reflection, signs of students making connections were found. Students made connections of their own experience with the theoretical and pedagogical issues that were discussed in class. The study concluded that the habit of reflective thinking could not be created alone with the assignment of writing autobiography. It provided a source for the author to understand students and for students to discuss with their peers. This study shows the importance of seeking and interpreting evidence from both learners and teachers.

Langer (2002) used dialogue journals in a Computer Architecture course for a period of three semesters. During these periods, there were about 300 adult students writing learning journals for a period of 15 weeks. The tutor would return comments to students each week. The process lasted for 15 weeks. Findings were based on data analysis of a selection of 20 students' learning journals and an interview of 10 volunteer students 6 months after the completion of the course. He found that the reception and perception of the journal assignment was a factor which affected the quality of reflection. Langer found that learning journals helped students to learn but not all students showed deep reflection in their journals. Another finding was that adult students had difficulty to relate reflection to their career. The experience of Langer supports the importance of learner's understanding of the goals that teacher proposes. If students do not understand the goals, it is unlikely that their perception and reception of the teacher's instruction will be good.

Spalding and Wilson (2002) carried out a study to investigate the effect of a combination of strategies like journal writing, instructor feedback in terms of levels of reflection, guided reflection and peer sharing. The study involved 34 pre-service teachers for a period of one semester when these students were having a field experience in school. Data analysis was based on four students who showed growth in reflection. The finding of the study based on selected cases studies were summarized as follows:

- students appreciated the instructor's feedback in the process of reflection;
- students were ambivalent about the value of peer sharing;
- no single pedagogical strategy was best for all students;
- journals helped to stimulate reflection.

The authors reported that it was time consuming to write feedback. Despite the appreciation of instructor feedback, the study did not show a growth of reflective thinking for all students. Since the authors just specified the level of reflection students had shown, they did not provide advice on how to improve. This type of feedback is of limited value to students (Black, Harrison et al. 2003).

Griffin (2003) used critical incidents as a means to help 28 pre-service teachers to think reflectively and critically in their field experience. It lasted for 6 weeks. Students were given a template form to write their critical incident and were given explicit instructions about critical reflections. A total of 135 critical incidents were collected and analyzed by a three person review panel based on the level of reflective language and thinking, modes of reflective thinking and degree of orientation towards growth and inquiry. The results showed that there was no significant change in the first three attributes of reflective thinking but there was an increase in the degree of orientation towards growth and inquiry. The author concluded that there was a need to refine dialogue and feedback to students.

In a study conducted by Schweiker-Marra and her colleagues (2003), 20 pre-service teachers in their final semester of a bachelor degree program were requested to write reflective journals in a seminar course. The course discussed fieldwork and graduation requirements. These pre-service teachers were randomly divided into two groups. The only difference between these groups was that the experimental group received training in a reflective thinking model. The study showed that pre-service teachers in the experimental group increased their depth of reflective thinking by at least one level while those in the control group found little changes in levels. There was no noticeable difference in the length of reflective writing between groups. The depth of reflection increased over time for the experimental group but not for the control group. Besides students in the control group did not consider writing journals to be helpful. The study implies that using tools alone might not help much. It is necessary to provide guidance to students on a specific approach to foster reflective thinking. Reflective thinking model training might be a possibility.

Lim, Cheng, Lam, Fong and Ngan (2003) used semantic maps as a tool to enhance the reflective thinking of teachers. A semantic map is an arrangement of shapes connected

by lines to represent relation of ideas. They taught 58 teachers in kindergarten to use visual tools to help them think. Results shown were based on interviews with 12 teachers and the self-reflections of 4 teacher educators. All 12 students agreed that the process of thinking using the semantic maps helped them to think more extensively about their subject knowledge. But they found it difficult to use and express their thinking in terms of semantic maps. This might be due to the unfamiliarity of new visual aids, and that students were used to expressing their thoughts by words. The impact of using semantic maps on students' reflective thinking was not reported in the study. The study advocated for the use of semantic maps with guidance to help students.

Lee (2005) conducted a case study in Korea to investigate three pre-service secondary teachers' reflective thinking development in a fieldwork experience. Sources of data were from interviews, observations and written documents such as survey questionnaire and journal entries. The study found that the participants' reflective thinking level was affected by the mode of communication. Some students reflected better by writing while others showed strength in verbal format. Another finding was that the time allowed was not sufficient for students to develop reflective thinking in fieldwork and suggested that the cultivation of reflection should be integrated into the teacher training program earlier.

A summary of the various variables used for discussion of the study is given in Table 2-1.

Table 2-1. Summary of empirical studies which promote reflection

Study	Research Context	Sample Size	Time	Approaches to reflection	Data collections tools	Findings
Garmon (1998)	Laboratory section of multi-cultural education course	22	1 semester	Dialogue Journal, instructor feedback	Journal writings	Journal writings help to promote reflection. It allows instructor to know students better. It is time consuming for the instructor to provide feedback. Not all students benefited from the experience.
Brown (1999)	Pre-service English Teachers in method course	11	10 weeks	Autobiography, guided questions, class discussion	autobiography	Autobiographies serve as common text for making connections and for promoting critical reflection but not to all students.
Langer (2002)	Adult students in computer architecture course	20	45 weeks	Journal, Instructor feedback	Journal, interview	Journal writing had caused half of the students to feel anxiety. Not all students benefited from the experience. Students had difficulty to understand reflection and write reflective journal.
Spalding and Wilson (2002)	Pre-service teachers in master program having field experience	4	1 semester	Journal writing in hard copy and email format, instructor feedback, guided reflection, peer sharing	Journal writing, notes on observation of teaching, post observation notes and interview	Not all students benefited from the experience. All students value the feedback given by the instructors. Time consuming to provide feedback to students.
Griffin (2003)	Pre-service teachers	28	6 weeks	Critical incidence, peer sharing,	Critical incidence and self-assessment statements	No significant change in attitudes of reflection but there are signs of reflective attributes denoted by Dewey.

Schweiker-Marra, Holmes et.al (2003)	Pre-service teachers in final semester of the program	20	1 semester	Journal writing	Journal writing, interview	Students' attitudes towards journal writing were mixed. They said that journal writing took too much time. Students taught with reflective model reflect better than those in control group. Students in control group preferred to have alternatives to journal writing.
Lim, Cheng et al. (2003)	In-service teachers	58	Not clear	Semantic maps	Interviews and self-reflections	This process of thinking using the semantic maps helped them to think more extensively. It is difficult to use and express their thinking in terms of semantic maps
Lee (2005)	Pre-service teachers in Korea having field experience	3	1 month	Journals and interviews	Observation, interview and journals	Mode of communication affects students' reflection. Time was not sufficient to develop reflective thinking.

The research context of the above studies is mostly in teacher education programs. Most of them are conducted when students had fieldwork experience. The period of study ranges from several weeks to three semesters. The sample size reported in the studies is small. Despite other tools such as observation and questionnaire used to analyze the study, data collection tools in most studies relate to the approaches to facilitate reflection. Despite the different ways to facilitate reflection in these studies, a common approach of most studies is feedback provided by instructor or peers.

These studies show that writing journals facilitates the communication among tutor and students. It seems that journal writing is an important strategy to cultivate students' reflective thinking. However, the best way to use journals most effectively is still unclear (Todd, Mills et al. 2001). The result of the above studies in terms of increasing the level of reflective thinking is ambivalent. The common feature of the results is that not all students benefited from the experience. There are several explanations for this situation. It might be due to the support provided by teachers, students' perception of writing journal, lack of knowledge about reflection and novelty to the medium of reflection like semantic maps. Most of the studies found that students need concrete examples or explicit guidance on how to improve their learning despite the tools used - writing journals, autobiographies, semantic maps or critical incidents. They value the feedback provided by instructor. It seems that a common text or diagram is a necessary condition to enable students to engage in reflective practice. Both students and instructor perceive engaging in reflection is time-consuming. These factors suggest the importance of context coined by Boud and Walker (1998) for reflection in learning. They pointed out the requirement of considering social, cultural and psychological issues when designing an environment for reflection.

2.2. Assessment

In its simplest meaning, assessment when used in the context of education involves the concept of deciding, collecting and making judgements about evidence relating to the goals of the learning being assessed. This process of collecting evidence and making judgements in classroom can be further categorized by the purposes of using the evidence as assessment of learning and *assessment for learning*. The following section discusses the importance of the alignment of assessment and the teaching and learning process which is often driven by the learning theories.

2.2.1 Assessment of learning: Purposes and impact

As its name suggests, the term *assessment of learning* is used to mean assessment with the purpose of providing a summary of achievements at a particular point. Its role is to provide information of students' achievement. It is used to record and report what students have learnt or achieved in the past. Since *assessment of learning* serves as a performance indicator of students' learning, different stakeholders such as students, parents, teachers, schools, employers and governments are all interested in it. Students need the summative results to prove their competence at a certain level. The result also serves as an indicator of how well the school or teachers educate students. The government can use the results to see if its resources are allocated properly. Therefore summative assessment is also termed high-stakes assessment. It is used for the purposes of certification and accountability. It has been dominant in education for many years which Shepard (2000) construes as reflecting behaviourist theories of learning, social efficiency and scientific measurement. Summative assessment must be reliable, robust and affordable to fulfill the above purposes. Teachers and students are used to paying attention to summative assessments within the educational system. However, they are unaware of the questions associated with the predictive and consequential validity of summative assessments and believe the results uncritically. Students with poor performance in these assessments tend to be less motivated to learn. Predominantly judgmental feedback in terms of scores or grades affects student motivation for learning because it does not provide constructive advice on how to improve and leads to a feeling of helplessness (Harlen 2006).

Knight (2002) argued that the summative assessment practices at higher education level were in disarray and doubted the validity of the grade or marks obtained from summative assessment. For the assessments to be reliable and robust, the assessment tasks tend to assess things that people believe can be judged reliably. This might distort the enacted curriculum to focus on those skills that can be reliably assessed, at the expense of a broad range of skills. The assessment does not record or celebrate other achievement such as critical thinking and self-regulated thinking which may be more important in a rapidly changing society. Boud and Brew (1995) also questioned whether summative assessment was able to cope with the complex learning goals embraced in higher education. He also warned that it might actually impede them.

Boud, Cohen and Sampson (1999) listed three negative effects of *assessment of learning* from the viewpoint of peer learning. They were:

- Summative assessments usually were norm-referenced which implied and required the notion of competition among students rather than cooperation. Therefore learners' individual capability was emphasized rather then collaboration with others.
- Assessment was so important to teaching and learning that the curriculum tended to be limited by outcomes measured by the assessment practices. These assessment practices were set up by the teacher in the classroom environment without any involvement of students.
- Inappropriate forms of assessment tended to facilitate students taking a surface approach to learning rather than deep learning. Students looked for ways such as rote learning and repetitive drilling for tests to get the maximum marks out of the assessment tasks.

Therefore, the goal of facilitating students' learning to be achieved through *assessment of learning* is questionable.

In summary, many of the current practices associated with the *assessment of learning* are product oriented with the purpose of demonstrating what a student has learnt. They tend to increase competition among students and encourage students to focus on learning for the test. It has been argued that it is not suitable for use in classroom environments, because learning is socially constructed, not transmitted. The

following section identifies another type of assessment designed to promote student learning. The difference between the two assessment paradigms will be described.

2.2.2 Assessment for learning: Potentials and challenges

The prevalent form of assessment - *assessment of learning* - is being criticized as being of less value in raising the standard of learning in comparison with *assessment for learning*. The notion of *assessment for learning* is defined as 'a process of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go, and how best to get there.'(Assessment Reform Group 2002). The central purpose of *assessment for learning* is to contribute to student learning through the provision of information about performance. In this case, assessment is used for formative purposes. It is not a new concept in education but it is often marginalized. However, it has enjoyed a resurgence in the 1990s. It seems from the definition that formative assessment is nothing new. Teachers have been practising formative assessment in terms of classroom discussion and observation all the time. But if the definition is closely read, the emphasis of this process is shifted from teacher only to both learners and teachers to look for information which will direct learners in their learning process.

Is the practice of *assessment for learning* worthwhile? A seminal paper by Black and Wiliam (1998) showed that improving formative assessment helped to increase the standards of learning. In a comprehensive review of research literature, they examined studies ranging over ages, across subjects and over several countries. Their result showed that the use of formative assessment typically produced attainment gains corresponding to an effect size of 0.4 to 0.7, i.e. it would increase the performance of student in the UK GCSE public examinations by at least one grade. In addition, if *assessment for learning* is implemented successfully, it helps to develop students' motivation for learning as an enduring disposition (James and Pedder 2006). This is because students are given specific directions of how to improve. Besides, they are also encouraged to become self-evaluators who are able

to access and regulate their own learning.

To experience the power of *assessment for learning* is not a simple matter; Black (1999) argued that there was no 'quick fix' to reap the benefits of formative assessment. Elwood (2006) argued that the importance of alignment of assessment practice and the theory of learning might contribute to the success of *assessment for learning*. The relationship between assessment and learning theory is given in next section. Black (1998) suggested a theory of formative assessment that embraces a learning theory of constructivism. Yorke (2003) related it to Vygotsky's notion of 'zone of proximal development'. These two scholars perceive the importance of students taking an active role in assessment with the support of their peer and teacher. Therefore student learning has to be facilitated with the guidance and support from peers and teachers to push their zone of proximal development. The collaborative act between tutor and students becomes a foundation of formative assessment. One of the principles of *assessment for learning* is the collaborative nature of the process of assessment. In this process, students interact with tutor or peers to exchange information to direct them towards their next learning goals.

The principle of *assessment for learning* is quite different from many existing classroom practices. Therefore the pedagogical implication of *assessment for learning* requires teachers and students to change the way they think about their classroom roles (James and Pedder 2006). For example, knowledge is not transmitted by the teacher but is constructed by students with the facilitation of teachers. Teachers are not knowledge transmitters. Teachers have to provide opportunities for students to explore understanding and to engage in thoughtful discussion. Students are not passive receivers of knowledge. They have to be regulators of their own learning through self-assessment and peer-assessment. This means that they have to reflect on their learning, identify new objectives, analyze and evaluate problems to move forward. In the *assessment for learning* classroom, teachers should foster students' reflective thinking while students are self-regulators. It is questionable if students in Asian culture aware of this new role.

In classroom practice, the norms of behaviour have to be changed as well. For example, teachers should provide explicit learning goals for students to understand.

Students need to understand how they are learning and reflect on their learning strength and weakness. An interactive teaching and learning environment has to be promoted. It is likely to achieve this condition through appropriate questioning by teachers, constructive feedback, peer and self assessment by students (Black, Harrison et al. 2003). Constructive feedback is feedback that is specific enough for students to reflect on the quality of their work. It should not make comparison with others. Both self assessment and peer assessment require students to be aware of and apply standards or criteria to their work. Students have to judge the extent to which they have met these criteria as well (Boud 1994). To involve students in self assessment and peer assessment, teachers should use various ways to help learners understand the goals they are pursuing and the criteria for assessing learners' work (Black and Wiliam 2001). Besides, students should be given opportunities to participate in the construction of criteria. If these areas are handled properly, learners and teachers are likely to obtain relevant information to reflect and communicate on classroom practice so as to identify next steps in their learning.

Despite the potentials and challenges listed above, the comprehensive review conducted by Black and Wiliam (1998) is mainly based on studies in western countries. The value of *assessment for learning* is still to be confirmed in other contexts. Can the same results be applied to a different context like developing countries or eastern countries where the perceptions of teachers and parents, the kinds of learning encouraged, and students' attitude are different? Sebatane (1998) pointed out that the communication of feedback obtained from assessment was critical to students' learning. The role of technology in collecting and transmitting feedback to student is still largely unknown. Further, Elwood (2006) questions the potential of formative assessment to sustain students' learning gains in the long term and urges for more research in this area.

The implementation of *assessment for learning* in practice is not as easy as one might suppose. The following examples illustrate the problems encountered when implementing *assessment for learning* and highlight some facilitating and inhibiting factors. Carless (2005) illustrates two cases for the implementation of *assessment for learning* in Hong Kong. One of the cases shows how an English teacher in a primary school shares the assessment criteria with students and students take part in assessing

their peers using a checklist. The other case reports how an English teacher incorporated peer assessing in class so as to improve students' grammar. In these two studies, even though teachers are pleased to know more about their students' learning and some students practice self-assessment, they reveal the tension in this approach with the typical approach of teaching, learning and assessment in Hong Kong. Carless (2005) concludes that the success of these two studies is the result of the congruence of the principles of *assessment for learning* with the learning theories of teachers and the external supports provided by him. At the same time, he also points out problems in Hong Kong for the implementation of *assessment for learning* by school teachers as follows:

- dominance of competitive examinations allied to a simplistic view of assessment as testing amongst many stakeholders
- lack of deep understanding of assessment issues by principals, teachers and parents
- lack of time, capacity and the will to engage with myriad issues in teaching, schooling and educational reform in which *assessment for learning* is just one strand.

Smith and Gorard (2005) conducted an experimental study based on 104 year 7 students in the UK for one year. The experimental group was given enhanced formative feedback on their work but no grades, while the control groups were given marks and grades with minimal comments as is the usual practice in schools. The results show that the progress of students in experimental groups in public examinations was inferior to that of the control groups. One explanation for the negative effect was the misunderstanding of fundamental concepts of *assessment for learning* and inappropriate implementation (Black, Harrison et al. 2005).

These two empirical studies implemented only aspects of the techniques of *assessment for learning* such as feedback, self-assessment or peer assessment. They did not use a combination of techniques to help students learning. They listed several difficulties with the existing literature about the implementation of *assessment for learning*. They are:

- The congruence of the principles of *assessment for learning* with the learning theories of teachers

- Misinterpretation of the essence of *assessment for learning*
- Teachers' favourable disposition towards reliable, formal assessment
- Teachers are facing lots of changes, and are resistant to further innovation
- Students' perception of appropriate feedback.

To implement *assessment for learning*, it is very important to consider if the learning theories of teachers match with its principles. The next section provides an overview of learning theory with that of assessment. It is argued that the alignment of learning theories and assessment is necessary to build a supportive learning environment.

2.2.3 Assessment and Learning theories

There are different perspectives on the view of what learning is and how it takes place. The process of learning, the environment for learning and the product of learning are interpreted differently if the theories of learning differ. The alignment of assessment with learning, teaching and content knowledge is necessary. However, assessment practices appear to lag behind the development of learning theories (Elwood 2006). James (2006) presents three views of learning and argues that the assessment practice should be modified accordingly so as to achieve validity and coherence.

Firstly, from behaviourist perspectives, learning is viewed as the conditioned response of learners to external stimuli such as rewards and punishment. The environment is an important source of learning. Simple skills can be accumulated to perform complex tasks through practice and memorization of information. Assessment tasks focus on rote recall. Tests are used frequently to ensure mastery of skills before proceeding to the next learning objectives. Speedy performance is considered as the achievement of learning. Good performance in tests is a form of positive reinforcement to learn.

The cognitive and constructivist theories of learning view learning from a different angle. Learning requires the active construction of knowledge from learners. Learners understand meaning through organizing structures, concepts and principles

in schema. Prior knowledge affects the construction of new knowledge. Achievement of learning is associated with the organization of knowledge in structures. Assessment is conducted to check one's cognitive structures and cognition.

Social-cultural, situated and activity theories of learning emphasize the value of interaction between learners and the social environment. Learners develop their thinking together through active participation in the community. Social relationships must be built before learning occurs. Knowledge in this perspective is embedded in the context. Assessment practice under this view cannot just measure an individual's knowledge structures. Elwood (2006) suggests the interaction between the teacher and the learners is the place that any assessment practice should pay attention to.

James (2006) notices that the relationship between learning, teaching and assessment is not straightforward. Things cannot be easily aligned. The fitness for purpose of learning outcomes is an important consideration in making judgments about the use of assessment practice. A blended approach is proposed for consideration to achieve the goal of consistency and coherence. Attention to the purpose of assessment is very important because assessment is a means to an end, that is learning, not an end in itself. The two concepts of *assessment of learning* and *assessment for learning* can be applied to these three types of learning theories. However, the proportion of summative and formative assessment should be adjusted accordingly. Therefore assessment should be done for and with the learners instead of done to them.

2.2.4 Summary

Assessment is one of the key factors affecting learning and teaching. The purpose of *assessment of learning* is listed with its impact. This form of assessment might lower students' motivation in learning and encouraging students to take a superficial approach to learning. A different approach to assessment, *assessment for learning*, is presented. It has the potential for improving students' learning. The essence and challenges of *assessment for learning* are extracted from literature. To achieve a valid and coherent assessment practice, learning theories have to be considered. Behavourist approaches to learning fit *assessment of learning* while cognitive and constructivist approach of learning match with both *assessment of learning* and

assessment for learning.

2.3. Conclusion

In this chapter, different views of reflection and theories of learning are presented. In the work that follows, Boud's model of reflection is used as the theoretical framework for designing the IT curriculum, and for the interpretation of data regarding student's reflective thinking. The principle of social-constructivist approaches to learning is the focus of the current study. *Assessment for learning* is considered to be more appropriate for the study because its underlying theory fits with the teaching and learning principles of the author. The concept of *assessment for learning* is acknowledged as a major influence on student learning in the course design and development. Thus assessment activities are incorporated with the concept of *assessment for learning* (mentioned in the Methodology chapter). The reason why and the approach of translating this idea into tangible practice using blog and portfolio is presented in next chapter.

Chapter 3. E-Implementation of assessment for learning

This chapter describes the tools - namely blogs and digital portfolios – which were used in the research to implement the concept of *assessment for learning*. The nature of these tools is described, along with their application in educational settings. An analysis of previous research strategies in these areas follows. Finally, this chapter discusses the suitability of blog and digital portfolio in fulfilling the theoretical approach of the study.

3.1. Blogs: their nature, potentials and drawbacks

The term blog is an abbreviation of web log. It first appeared in the late 1990s and became very popular - the number of blogs has increased exponentially within the past few years. Applications of blogs cover a wide range of areas such as personal uses of keeping a diary with reflections, a platform for journalism, educational uses, a channel within a discipline where experts exchange ideas and works, and business (Ducate and Lomicka 2005; Lum 2005; Quible 2005; Brownstein and Klein 2006) etc. What exactly is a blog? Why has it become so popular within such a short period? The nature of a blog provides some hints to its popularity. Some definitions and descriptions of a blog include the following:

- "a hierarchy of text, images, media objects and data, arranged chronologically, that can be viewed in an HTML browser"(Winer 2003)
- "just a web site organized by time" (Lipton 2002)
- "Internet based information disseminating tools" (Schroeder 2003)
- "A type of frequently updated online journal" (O'Shea 2003)

From these definitions, a blog is simply a website which contains blog post. A blog post or entry usually contains three basic attributes: title, link and description. The author of the blog, also called a blogger, may include different media such as text,

images, video, sound and hyperlinks in the description section. The content organization of the web site is automated over time and is displayed with the most recent entry at the top.

Weblog is a new application of the Internet. It enables one to create a personal published web site with great ease. The technology that works behind weblog is RSS (Rich Site Summary) document. It is an application of XML (Extensible Markup Language). There are tools available for one to create RSS documents such as Blogger (www.blogger.com), Blog Chinese (http://www.blogchina.com/) and Manila (http://www.manila.com). The use of this RSS document allows one to exchange content as well as integrate information into one's own weblog without having to bother about the appearance of the blog. Several years ago, people had to learn HTML (HyperText Markup Language) or use web page authoring tools before they could publish web pages on Internet. Due to the development of technology, this is not a requirement anymore. People can develop and update their web pages directly using web browsers as easily as if they are writing email. Besides, the content of the blog is published instantly once the author of the blog posts the entry. Therefore the information which the author wants to share with others can be seen at once. It is viewed as a powerful information sharing tool.

The technology also enables readers to obtain the most updated blog entry using the RSS aggregator. Once the reader subscribes to a certain blog, any updated information posted by the blog author will be sent to the reader using the RSS tool. Besides the feature of instant publishing, the blog content is dynamic as well because it has the built-in mechanism of feedback. This allows readers to provide comments on the messages written by the author. The author may also respond to the feedback. The process of writing blog entries, and reading and commenting on blog entries is called blogging. The content of the blog can be lively documentation of the communication between the blog owner and the blog readers. The feedback automatically keeps track with the original blog entry. This eases the reading and responding process because the related messages are grouped together. This in turn eases the process of collaboration. It serves as a form of one-to-many communication.

The specific features of blog including the ease of use, rapidity of deployment, powerful information sharing and ease of collaboration have made it a potentially useful tool in education. Despite its appealing features, the use of blogs is not unproblematic. The first weakness of blog is that it requires continuous updating of information otherwise readers may quickly abandon the blog and look for other interesting blogs. There are issues of persistence - is it easy to keep up the practice of writing a journal online? and of openness - are teachers willing to share their thoughts with others? As blogs are part of the web, the content of blogs is opened to public inspection. People using a web browser can view the blog content without any authorization unless it is specially designed. Therefore not everyone likes to post ideas or opinions online. Besides, as blog usually represents the owner's viewpoint, readers should not assume that it represents the group that the owner represents (Finneran 2006). Since a blog is a personal space for one to express and exchange ideas with readers, the perspectives that appear in the blog represent those who participate in the discussion only. The reliability of information has to be critically reviewed. Questions such as "Who is responsible for the content of the weblog?", "What is the aim of the weblog?" and "How often is the weblog updated ?" should be kept in mind. Clyde (2004) drafted a set of criteria for evaluating blogs such as authority, purpose, currency, scope and coverage.

3.1.1 Review of blogs in educational context

Most of the literature on the educational uses of blog describes its potential, and frameworks for using blog in educational settings (Clyde 2005; Ducate and Lomicka 2005; Quible 2005; Brownstein and Klein 2006; Ray 2006) For instance, Ray (2006) illustrates various ways of using blogs including blog as a communication tool, blog as instructional resources, blog as a collaborative tool, blogs as showcases for students' projects. Very few articles provide empirical results to substantiate their claims.

Among the literature located on the application of blogs, Glogoff (2003) applied blogs in an online Masters course involving 29 students in the area of information science and education. Students are geographically separate so web-based communication tools are necessary. Students were requested to post and comment on

news about technology and its application related to their field. Survey results showed that two-thirds of the students had a positive experience in using the blog. They learnt more about the technology using this information sharing tool. Since the context of the learning environment is online, and students are geographically separate, the number of students who were satisfied with the blog tool is understandable. It is reasonable to ask if the lessons learned in this context can be generalized to situations where some face-to-face instruction is available. Is the experience of students using blogs in distance education the same as those in a traditional learning environment or blended learning environment?

Barry and colleagues (2006) used blogs in a blended learning environment for a group of 15 technology students in higher education for a period of 10 weeks. Blog was explored as a collaborative learning tool. They found that students' interaction with peers was more than that with tutor. Blog enhanced the learning experience for both students and tutor. Blogs seem to be a suitable tool for group work. They also found that students' participation in their own blog was correlated to their attendance in class.

Amstrong and Retterer (2004) merged blogs in to a Spanish course in college for 16 students. A blog was used as a personal space for students to improve their writing skills and reflect on their learning. In addition, a course weblog was set up for students to write an online, coherent and cohesive mini-novel collaboratively. The study did not show that blogs helped to improve student's writing ability in Spanish nor the collaboration among peers. The result showed that students considered the practice of writing on a blog was easy and two-third of students had a positive experience of using it.

Ducate and Lomicka (2005) applied blogs in a foreign language class by requiring students to read blogs of native speakers first and then writing blog entries in an exchange program abroad. The purpose of employing blogs was to arouse students' cultural awareness and learn foreign language. The results from a survey showed that students' cultural knowledge and foreign language vocabulary increased as a result of reading and writing blogs.

The experience of Blood (Blood 2000) showed that the practice of writing a journal entry online daily, could enhance positive writing skills, instill self-confidence in voicing personal opinions especially if one received helpful feedback, and could promote reflective thinking. Spalding and Wilson (2002) showed that, while it took time for the tutor to provide feedback to students on their blogs, students reported that the feedback given by tutors was very valuable. In order to provide appropriate feedback to students within the limited time available, they suggested that the tutor had to make decisions on which student contributions to respond to.

The above empirical studies apply blogging in different contexts such as online courses, face-to-face instruction and blended courses. Purposes for the application of blogs include collaboration, communication, personal writing areas and information source. These studies show that researchers explore the educational uses of blogging in different ways. Students are encouraged to communicate more with one another. They have to write novels using a blog and to exchange information in this environment. Even though these studies show that students have a positive experience of blogging, the results of these studies could not be generalized. First, the research design of some studies is not included for analysis. Second, the sample sizes in the studies are too small. The value of a blog in support of collaboration and communication is not strong enough because only one of the studies reported this view. More work still has to be done in this area to substantiate the findings and to identify problems and limitation of using blog in educational settings.

3.2. E-Portfolios: varieties and uses

3.2.1 Portfolios – definition and features

Before proceeding to the introduction of an e-portfolio, it is necessary to describe portfolios because e-portfolios develop from portfolios. There is no single official definition for a portfolio. Its meaning varies depending on the purpose and context where it is used. Originally, a portfolio was a folder where art work of an artist is kept. However, in teacher education programs, its definition is much broader than just a folder. Different authors offer different definitions and some are listed below:

- A portfolio is viewed as comprising of two components: process and product. Both the process and the product focus on the aim to help students articulate their understanding as a teacher (Loughran and Corrigan 1995).
- Portfolios are a means by which students select and reflect upon artifacts of their practice collected over time and from multiple sources and diverse contexts to provide evidence of their thinking, learning and performance (Darling-Hammond and Snyder 2000) .
- It is a dedicated collection of a learner's work assembled over time that documents one's efforts, progress and achievements (MacIsaac and Jackon 1994).
- A portfolio is a container of collected evidence with purpose. Evidence is documentation that can be used by one person or group of persons to infer another person's knowledge, skill and/or disposition (Collins 1992).
- Portfolios are both product- and process-oriented and involve educators in the purposeful, collaborative and reflective process of selecting and compiling multiple sources of information that reveal their beliefs, skills, knowledge, accomplishments, unique characteristics and commitments with respect to a variety of teaching and learning experiences (Guillaume and Yopp 1995).
- A portfolio is a collection of work that demonstrates a student's understanding, beliefs, attitude and growth (Karp and Huinker 1997) .

No matter whether the portfolio is perceived as a product, process, means or container of evidence, the portfolio has the characteristics of "PART" where P means purpose, A for artifacts, R for reflection and T for time.

Purpose – Every portfolio should have a purpose in it otherwise it is just a folder for collecting things. Depending on different purposes, the artifacts included in the portfolio are different.

Artifacts - Artifacts are evidence that are useful to represent one's ideas in mind. It can comprise various items such as lesson plans, teaching philosophy, reading list etc. The items can be in various formats such as photo, video, audio and manuscripts.

Reflection – Reflection occurs during the process of portfolio construction and it is

included in the final product as well for others to understand one's overall portfolio. It is the most important feature of portfolio. It creates meaning for the portfolio.

Time – The feature makes it different from traditional assessment schemes. It allows one to collect evidence over time. The time involved for the portfolio may be short or long depending on the purpose. Documenting at different stages of a product shows the evolutions of the product.

It is also due to variation of these features that there are various forms of portfolio. Different names are used for differentiating different purposes. For example, there are presentation or best work portfolios (Salend 2001), developmental portfolios (MacIsaac and Jackon 1994; Loughran and Corrigan 1995; Karp and Huinker 1997; Hansen 1998; Darling-Hammond and Snyder 2000; Klenowski 2000) etc. A presentation portfolio is one which shows a teacher's strengths, achievement and area of expertise. A developmental portfolio contains items which represent student growth over time.

In summary, portfolios can sample the actual knowledge, skills and dispositions of teachers in context. Evidence is collected over time from various sources with the emphasis on self-assessment and professional dialogue. Therefore it has the potential to be an authentic assessment as specified by Darling-Hammond and Snyder (2000).

3.2.2 The move towards digital portfolios

With the advancement of technology and the development of portfolio assessment, the digital portfolio is becoming more important. In many schools, students produce their work in electronic forms (Batson 2002). Would it be repetitious to request students to convert digital evidence to paper-based format? Paper portfolios have various types of evidence such as audio tapes, video tapes, photos and documents. They occupy a large space and are difficult to maintain. Besides, it is not so easy to retrieve and view specific evidence as it requires different devices to operate.

The move towards digital portfolio solves some problems of paper-based portfolio but it also generates new problems related to the use of technology. More

information can be kept in digital format with less physical space occupied. The computer offers a uniform platform for one to collect, organize, retrieve and display evidence. It is easier for distribution in digital formats such as CD-ROM or web pages. Therefore it supports a wider audience. The design and implementation of the digital portfolio is not without its problems. It requires more resources in developing digital portfolios than conventional ones. People who build portfolios are required to have a certain level of computing capability. Furthermore, more technical support is needed.

Gibson and Barrett (2002) classified current practices of electronic portfolio development into two approaches: using generic tools and customized systems. The first approach refers to the use of common productivity software to produce portfolios. This software includes word processing tools such as Microsoft Word, presentation software like Microsoft PowerPoint, HTML editors for example Microsoft Frontpage and Macromedia DreamWeaver, portable document format (PDF) tools like Adobe Acrobat and multimedia authoring tools such as Macromedia Authorware and Multimedia Builder. Portfolios implemented by generic tools allow one to control the overall design, organization and development. However, it requires one to be skillful in IT techniques such as converting items to a compatible format for display and maintenance. Besides, one has to organize different items of the portfolio in a systematic manner. Not all people possess such advanced computing capabilities and organizational skills.

Customized systems are developed using programming languages and database technology by publishing vendors or research institutes. Portfolio systems such as Blackboard Content System by Blackboard, ePortfolio with RubricMarker by Chalk and Wire, Epsilen Portfolios by ePortaro, iwebfolio by Nuventive, Mosaic from R-Smart Group and Open Source Portfolio, have features of standardized outlook and functions to ease management and to analyze information collected. With these built-in functions, portfolios collected through customized systems are easier to grade in the context of large scale assessment. Portfolios in digital format - especially portfolio systems - facilitates their use for high-stakes purposes. As the standardized functions provided in the portfolio system help to generate portfolios which are required by different stakeholders easily, digital portfolios composed by

systems are easier for comparison and scoring.

A customized portfolio system has a template for one to create a portfolio. Even though it relieves one from the design of portfolio, one has less control on the production of portfolios. This is what Barrett (2004) considers as shift of 'locus of control' from learner to institution. Users have less motivation to build portfolios and their sense of ownership might be reduced. This in turn might undermine the value of the portfolio as a self development tool. If there is little guidance and discussion opportunities offered to students, students' active involvement in the process of portfolio creation might be reduced.

Competency in IT skills is required in assembling a digital portfolio using both generic and portfolio systems. But the required level of IT competency is different. One has to be proficient in IT when creating portfolios using generic tools. This requirement will not be necessary when using portfolio systems. Wieseman and Wenzlaff (2003) found that users with limited IT skills paid too much attention to producing portfolios to meet the state regulation. They had little time to reflect on their work and considered portfolio as a professional development tool. Therefore, it is important to build a supportive atmosphere such as providing technical support, in the process of portfolio development. This is often neglected when portfolio is used for certification purposes.

Above all, the design of a portfolio has to consider its purposes namely development, presentation and evaluation. Customized portfolio systems are more favorable to presentation and evaluation portfolios while generic tools appear to suit the developmental purposes of portfolio compilation. Despite generic tools or portfolio systems used to compose digital portfolios, one has to possess IT skills.

3.2.3 Review of portfolios in teacher education

The use of portfolios has gained much attention in professional areas especially in teacher education. Teachers have used it in various areas such as writing, teaching practice (Klenowski 2000), teaching of art (Cho 1999) and assessment. Portfolios have the potential to support instruction (Darling-Hammond and Snyder 2000).

Information gathered in the portfolio process help teachers to revise their teaching in terms of contents and strategies. It is also considered as an authentic form of assessment (Mick 1996). Portfolio assessment offers opportunities for teachers to collect context-based evidence. Assessment without taking context into consideration appears to be invalid, if one is to accurately evaluate the actual and complex situation of instruction (Darling-Hammond and Snyder 2000). Portfolios also help teachers' professional development especially in developing teachers' reflective thinking (Jarvinen and Kohonen 1995; Wade and Yarbrough 1996; Wilcox 1996; Lyons 1998; Winsor, Butt et al. 1999). In reviewing the articles related to portfolios, most of the papers read provide a rationale for portfolio assessment and experience of portfolio development both in USA and other countries. There are only a few articles that report results based on empirical evidence.

Loughran and Corrigan (1995) explored science student teachers' understanding of portfolios in Australia. The portfolio was not graded; instead students were encouraged to produce portfolios for employment purposes. The study found that students' past learning experience influenced their perceptions of portfolios.

In the study of Wade and Yarbrough (1996), 212 undergraduate teacher education students collected portfolios in social science method courses. Results of the study were based on anonymous surveys, selected in-depth interview and essays. The study found that students were confused and frustrated with the portfolio initially. Portfolios helped many of them to reflect on their experience but not all students. Their experience suggested that guidance should be provided to students at the very beginning of and during the portfolio construction e.g. on the appropriate structure of a portfolio.

Winsor and colleagues (1999) also conducted a three-semester longitudinal study of portfolio development with 15 volunteer students during their internship programs. Their purposes were to investigate what kinds of themes students had at the beginning of portfolio development and what themes persisted throughout the whole study period. Data were collected from interviews with students. They found that students were concerned with the practical and technical issues of preparing the portfolio at the beginning, like the content of the portfolio, the selection of evidence

and the time required. As the time spent developing portfolios increased, students found that they were better at setting goals and experienced satisfaction when achieving each goal. They also reflected more on their work.

In Hong Kong, a study had been done on the implementation of portfolios where teachers develop teaching portfolios (Klenowski 2000). Portfolios were used for assessment and learning purposes in the teaching of two modules namely "Classroom teaching skills" and "Teaching Practice". Even though nearly 500 students had participated in portfolio work, the findings of the study were based on a low response rate survey, and interviews of students and teachers. They found that developing portfolios helped students to become more active and independent in their learning. For instructors, information collected from the portfolios helped them to plan their instruction.

In the paper by Niikko (2002), the author adopted portfolios in a course for kindergarten teacher education. Students were requested to produce portfolios for a period of 3 years on a voluntary basis. However, the number of students who continued producing portfolios until the end of the study period was limited. Niikko found that only those students who had the intrinsic motivation could manage with the work.

Woodward and Nanlohy (2004) found that a supportive environment based on a well-formed framework for implementing digital portfolio was necessary so as to provide a worthwhile learning experience for students. Otherwise the danger of using technology to compose portfolios might undermine the learning opportunities of portfolio construction.

From the studies listed above, it is clear that some teacher educators are interested in using portfolios to help students in their learning and for their own instruction. The cases above are quite promising in terms of the results. They do provide hints on the implementation of portfolio in real context. Many of the studies are conducted in teaching practice courses or subject method courses. Data are collected and analyzed from interviews and structured questions provided in the portfolio. However, the number of teacher and students who participated in the portfolio development is still

small in size and most of the findings are based on qualitative data obtained from small numbers of students. The results from these studies are still to be verified to demonstrate their robustness. It seems that studies are being conducted to explore the potential of portfolios. More work should be done in different contexts with different groups, to explore the extent to which the claims made can be realized in practice.

3.3. Justification for the suitability of using blogs and digital portfolios to the study

Assessment for learning in the study is considered to be the process of collecting and interpreting evidence for use by students and teachers using tools like blog and portfolios to facilitate students' learning and teacher's instruction. It is closely related to the constructivist approach of learning as mentioned in section 2.2.2. According to the constructivist approach of learning, the role of the instructor is to facilitate students' learning instead of didactic teaching. How might technology such as a blog help the instructor to facilitate students' learning? Students are unique and their learning is affected by their background from the perspective of constructivist learning. Students are expected to be actively responsible for their learning. How might technology provide an environment which is suitable to each student's learning? Texts below try to answer these questions.

From the perspective of a course instructor teaching information technology courses, discovering and examining new technologies that promote student's learning is exciting and challenging. One of the barriers to the inclusion of information technology in education is the technical demand on users. In order for teachers to better integrate computer mediated communication tools into their teaching, they need to be familiar with tools available (Repman, Carlson et al. 2004). The user friendliness of a technology might hinder or promote one's adoption of the technology. As mentioned in section 3.1, blogs have the potential to allow users to focus on content production and free them from the technical aspects of writing web pages. Blog users reported positive experience when using blogs (Glogoff 2003; Armstrong and Retterer 2004). Therefore requesting students to reflect on their learning and to write their reflection in a blog tends to minimize the technical

demand of writing journal online. Students have to focus only on their review of a learning experience and write their doubts or questions in a blog. In this way, the blog environment seems to facilitate students' reflection on their learning. Reflection in the study refers to the act that students evaluate their class content or feelings and relate it to their past experience to arrive at new insights. At the same time, the course instructor might collect evidence of students' learning through technology. The evidence provides sources for the instructor to review instruction accordingly and respond to students.

The constructivist approach of learning emphasizes the self-engagement of students in the process of learning. Social-constructivist principles predict that students' construction of knowledge will be enhanced if they engage actively in the co-construction of knowledge with peers, and with their tutor. How might technology provide opportunities for students to take responsibility in their own learning and collaborate with their classmates? A blog is a personal space for one to write their ideas. Its personalized features and user friendliness may increase the motivation of users in writing blog entries. The built-in features of feedback and trackback within blogs are likely to encourage users to write and share reflections. Responses from bloggers such as the instructor and student's classmates are documented in the blog environment. It allows readers to comment on the blog owner's writing.

Blogs allow one to share ideas with others easily, and so could provide a useful platform where students might engage in appropriate learning activities. In this environment, students can explore their understandings and can engage in thoughtful discussion. A key question is how to invoke students' participation in collaborative learning through discussion using blogs. Bannan-Ritland (2002) showed that course instructors play an important role in the nature and frequency of participation by students in an online environment. Communication is facilitated by common experiences. In this study, participating in writing a class journal served as a common base for communication with tutor and peers. The details of the arrangement are given in next chapter.

Portfolio in traditional format or digital form has the potential to facilitate students'

development of reflection and tutors' instruction. The underlying theory of portfolio development is based on that of social constructivism. The process of portfolio compilation should involve collaboration opportunities and collegial support. Students are empowered to take an active role in the learning process. Barton and Collins (1993, p.209) considered "teaching, learning, reflection and assessment are intimately related in the portfolio model". Shulman (1998) mentions that portfolio institutionalize norms of collaboration, reflections and discussion which are important elements in constructivism. It matched well with that of *assessment for learning*. In addition, since reflection and *assessment for learning* go hand in hand, it is worth trying to implement the concept of *assessment for learning* using portfolios as well.

As a summary, this chapter illustrates how blog and digital portfolio are potentially appropriate tools to implement the *assessment for learning* concept. The experience of teachers in engaging the blog and digital portfolio might facilitate their reflective thinking and learning.

Chapter 4. Methodology

4.1. Introduction

This chapter outlines the details of the methods employed in this study. Since the purpose of the study is to enhance students' learning through assessment and technology in computer education courses, data are collected from students through technology in these courses. The justification for the choice of research methodology is outlined first. Then a description of participants, instruments, design, procedure, assumptions, and limitation follow accordingly.

4.2. Action research as the choice of methodology

Quantitative and qualitative methodologies are the two paradigms of investigating the social world. The quantitative approach focuses on the use of numbers to represent the human experience while qualitative approach describes and analyzes the quality of human experience in detail (Marvasti 2004). Since the two approaches have different assumptions about social reality, their methodology of conducting research involving the research questions, sample, data collection and data analysis vary in terms of the order and their interdependence. Despite this, they have the common features of building on empirical data and conducting research systematically. Each has its own strengths and limitations. For example, the findings of quantitative research are easier to generalize. Conversely, qualitative research provides in-depth study which is hard to achieve using the quantitative methodology. In doing educational research, these two approaches should be considered as complementary rather than as rivals. It is not appropriate to adopt one approach at the expense of another. Therefore, the principle suggested by Hammersley (1992) was followed in the selection of research methodology. It states that

> Our decision about what level of precision is appropriate in relation to any

particular claim should depend on the nature of what we are trying to describe, on the likely accuracy of our description, on our purposes, and on the resources available to us, not on ideological commitment to one methodological paradigm or another. (Hammersley, 1992:163, as cited in Silverman 2000 p12)

The purposes and the current resources available for researchers are the main selection criteria used in this study. Since the purpose of conducting the study is to improve the classroom practice and to better understand the situations that the researcher is facing, action research is an adequate approach to consider.

4.2.1 What is action research?

Definitions of action research vary in the literature. For example, John Elliot (1991, p.69) defines it as 'the study of a social situation with a view to improving the quality of action within it'. In Elliot's definition, he points out the importance of improving the quality of action through studying a situation but there is no indication of who carries out the study. Kemmis (1993 p.177) describes action research as 'a form of self-reflective enquiry undertaken by participants in educational situations in order to improve the rationality and justice of (a) their own educational practices, (b) their understanding of these practices, and (c) the situations in which the practices are carried out'. Kemmis describes the goal of action research in more detail and states clearly that this kind of research is conducted by the participants. So action research is sometimes referred to as 'practitioner research' (McNiff, Lomax et al. 1996; Murray and Lawrence 2000). Despite the different definitions of action research, one can identify the aim of action research as the improvement of the educational practice in which the researcher is engaged. This aim is the foundation of action research (Elliot 1991). It is superior to the production and utilization of knowledge derived from action research.

In terms of operation, Kurt Lewin who coined the term 'action research' first in 1944, outlines a model of the action-research process as identifying a general idea, fact finding, general planning, developing the first action step, implementing it, evaluation and revise the general plan. Then the same cycle is repeated with the second action step and so on. This process is acknowledged as an excellent basis for

starting action research. However, Elliot (1991) argued that the fact finding process should occur throughout the whole cycle of the model instead of just at the beginning. The analysis should be conducted simultaneously during the fact-finding stage. The evaluation process should be begun earlier so as to facilitate the implementation of each action step. The key processes of action research irrespective of sequences are 'planning, acting, observing, and reflecting' (Kemmis 1993, p178). In action research, researchers should consider processes with respect to the quality of outcomes and vice versa (Elliot 1991).

As compared with other research methodologies, action research is a form of research which can be carried out by anyone, in any type of environment, to study any kind of problem or issue (Fraenkel and Wallen 2006). It also has the potential to improve educational practice systematically and provides professional development opportunities for practitioners (Elliot 1991). Methods within both the quantitative and qualitative research can be applied in the action research. Conversely, action research has the threat that there are possibilities of researcher bias, implementation and attitudinal risk (Fraenkel and Wallen 2006). Since the researcher in the action research study is also the practitioner, there might be a conflict in roles. In the case of teacher, enquiry into the practice might distort and disrupt the teaching and learning process.

The essence of action research is for the practitioners to improve an educational practice which they are facing (Elliott 1991). The object of educational action research is to improve the educational practice (Kermis 1993). The importance of practice can only be studied in context with the practitioner as the most suitable person to embark on it. Action research is the study of praxis – informed and committed practice. It is embedded into the context in which the practitioner has to commit with strategic actions to solve the problem. The cycle of action informing theory and vice versa is formed. The work of others informs the practitioner about the social consequences of the practice or the perspectives of co-participants. If action research is conducted systematically and reflectively, the action-research process integrates teaching activities, educational research, curriculum development and evolution with integrity (Elliot 1991).

Before proceeding to the research design of the study, the section closes with the selection of action research as the choice of methodology. As the researcher is facing a complex situation where students are from various backgrounds and different computing abilities, the researcher has to look for means to identify the sources of this situation and to improve the teaching and learning process so as to enhance the learning of students.

4.3. Research design and procedures

In order to improve students' learning in the technology courses instructed by the researcher, the concept of *assessment for learning* is used to link the teaching, learning and assessment. The rationale of *assessment for learning* driven by social constructivist principles is in line with the teaching and learning philosophy of the researcher. To achieve a systematic and reflective approach of study, this section describes in detail the research design of the study including the sample, research questions, data collection and data analysis undertaken to achieve valid and reliable results, understanding and action.

4.3.1 Pilot study

In order to improve the validity and reliability of the research design, data collection methods and data analysis, a pilot study was conducted in the second semester of the academic year 2004-2005. The purpose of the pilot study was to glean light from the actual experience of implementation and research information that would be helpful to refine the design of the main study. Besides, the pilot study helped the researcher to gain experience of practical issues in conducting the study. Perceptions and behaviours of students were known and taken into consideration for the main study. In particular, the pilot study explored the following questions:

- Is the research design feasible in implementation?
- To what extent can the research design achieve the goal of the study?
- Can blogs serve as a tool for reflection and self-assessment?
- Do students use blogs to communicate with tutor or peers?
- What is the reaction of students to blogs?
- Is the WebCT helpful to students' collection of evidence?

- What is the practice of students constructing digital portfolios?
- Do they have any problems in using PowerPoint as a tool for compilation?

A small-scale research project was implemented in an Educational Technology course offered to students of the Bachelor of Education program in the University of Macau. One of the objectives of the course in Educational Technology was to make students aware of new learning resources and to engage them in the creative use of these resources in their teaching and learning processes. Therefore introducing new technology to students was acceptable. Students were requested to use technology to write online journals and produce a digital learning portfolio as part of the course assessment scheme. Eighteen pre-service teachers participated in the study. In the first lesson, data collection for the study began by obtaining students' computing background and preferences concerning computers. They were introduced to the course content, requirements such as writing weekly journal and production of a digital portfolio using PowerPoint. The framework of a learning portfolio was given to students. Students were reminded to document their class exercises in an online system called WebCT because class exercises were part of the learning portfolio. It allowed the researcher to read what students had done in class and also let them have their own class exercise evidence for their learning portfolio. A 30-minutes introduction to blogging was conducted as well so that students had an account for their personal reflection as well as understanding basic operations. Mechanisms for providing and responding to feedback in the blog environment were explained. Students were encouraged to blog, and to provide feedback to their classmates' blogs. Therefore students could reflect on their learning starting from the first lesson. Both online journals and learning portfolios were designed as a reflective tool for students to engage in the process of reflection, assessment, communication and collaboration. The course tutor read their weblogs weekly and provided appropriate feedback and encouragements to students in class.

The pilot study showed that the overall design of the study was feasible and helpful to the teaching of the researcher. It provided the researcher with practical experiences of how to implement the concept of *assessment for learning* in the actual course environment using technology. Further, the planned research design was discovered to be too demanding. At first, the research design included different data

collection tools like survey questionnaires to be done at the beginning and at the end of the study, and interviews of focus groups. However, due to the limited time and resources, interview of students and survey questionnaire on students' computing knowledge were cancelled. This is because the data collected from the online journals and the digital portfolios seem to provide sufficient information to answer the research questions.

Technology involved in the study seems to achieve its proposed functions. The pilot study revealed that blogs could serve as a communication tool between students and tutor. It allowed the tutor to better understand students and their learning. Some students also reported at the end of the course that they enjoyed writing journals using the blog. However, there was little evidence that blogs helped communication among students. A lesson from the pilot study was that more work must be done to encourage students' participation. As a direct result of the pilot study, participation was made a requirement in the assessment scheme of the course, to facilitate student learning and the main study. Many students reported that they had problems in writing a journal weekly, and were unclear about what should be included in the journal. Content analysis of students' journal discovered that students often record lesson activities rather than their reflections about these activities. Guiding questions for each lesson were provided for students with the intention of facilitating students in writing journals. The results showed that employing technology without appropriate instructional strategy did not help much in developing students' reflective thinking.

Further, students were new to the concept of learning portfolios. They did not know what should be put in the portfolio and they usually prepared it nearly at the end of the term. In order to encourage students to produce portfolios, students were requested to submit an early draft of their portfolio and time would be allocated to provide specific feedback on each others' work in the main study. Even though WebCT served well as a file cabinet for learning portfolios, students had problems naming the files when they actually compiled the portfolio using PowerPoint. This is because students used to name all the files with the same filename. Students were confused with the section of *Second Thought* in the portfolio requirement. Students seemed to be comfortable with the use of PowerPoint to produce the portfolio.

However, they had some linking problems when the portfolio was to be submitted using a CD-ROM. The issue of relative and absolute address was noted and explained carefully to students.

The above findings had important implications for course design and the research plan. The use of blog and portfolio in the course was appropriate as it served as a concrete evidence for communication and reflection. However, implementation issues such as arousing students to participate in communication among peers, the problems of students who did not know what should be written in a journal or a learning portfolio, and their habit of preparing the portfolio very late in the course, were important findings that had to be addressed before the main study could begin. The technical problems of producing portfolios were also noted.

4.3.1.1. Brief introduction of technologies employed in the study

Technology played an important role in the current study. It was integrated into the study in several ways like teaching, documenting, personal space for reflection and assessment. In the study, the following technology was employed.

Blog – As mentioned in previous chapter, blog is an online journal. There are a number of free blog tools available for use. A well-known web site in Macau, www.qoos.com, was selected to introduce to students to blogging, because of its popularity in Macau. Further, its interface is in Chinese. Students can input their thoughts in Chinese language. In addition, it provides statistical data such as number of comments received and a counter of access for each journal.

Digital portfolio – Digital portfolios can be produced using generic tools and customized systems. In this study, a general approach is chosen using PowerPoint for a number of reasons. First, the researcher wants to provide an opportunity for students to apply their knowledge and skills acquired on the substantive part of the course. Second, the use of simple tools enables students to understand the overall

design, organization and process of constructing a portfolio. Third, the tool is available everywhere in the university and most students have it at home. Fourth, most students consider PowerPoint to be quite user friendly. The experience of Wieseman and Wenzlaff (2003) showed that students using unfamiliar tools might put too much attention on technical problems rather than the issues of portfolio development. It is the latter that the researcher expects students to engage. Finally, it allows students to design their portfolio based on their intuition. This might increase their sense of ownership in the learning portfolio.

WebCT – WebCT is an online environment developed originally by the University of British Columbia in Canada. The University of Macau adopted WebCT as the e-learning environment of the university. It is an online platform that allows teachers to put their courses online to supplement their face-to-face instruction. In this online learning environment, tools are available for students to submit their assignment or class exercises so that tutors can view everything online and provide feedback. In the course of the study, the researcher uses the features of the system to distribute news and course content to students, to collect and review students' work in class, for tests and for class discussion.

4.3.2 Sample in the main study

The pilot study provided some evidence that the implementation of *assessment for learning* through technology can improve educational practice. Therefore, it was implemented again in the academic year 2005-2006 for both the first semester and second semester. The sample in the study included all the classes which the researcher taught in this period. The researcher believed that it was not ethical to exclude one group of students from a potentially beneficial experience. In one sense, the sample for the study was convenience sample. In another sense, it was also purposive sample because of its relation with the theoretical purpose of the study. There were about 117 (i.e. the number of students registered at the beginning of the course) students who experienced curriculum based on the concept of *assessment for learning* through technology. Nineteen of them experienced this kind of curriculum twice. They varied from the age of eighteen to forty. These students include both pre-service teacher candidates (69) and in-service teachers (48) respectively. For

pre-service teachers, they were studying year 1 and year 2 of the Bachelor of Education program. They were mostly fresh graduates of high school. For in-service teachers, they were teaching in different pre-primary and primary schools in Macau. These teachers attended the course after their usual teaching routine. Regarding the distribution by gender, the difference was great. Only seven of the students were male (6%) and the remaining one hundred and fourteen were female (94%). Brief information of the sample is listed in the following table.

Table 4-1. Brief information of the sample in the study.

Action research Cycle	Courses	Year of Study	Program	Status	No. of students
1 – pilot study	Educational Technology	1	Pre-primary Education	Pre-service	18
2	Computer Applications	2*	Primary Education	Pre-service	19
2	Computer Applications	1	Primary Education	Pre-service	27
2	IT in education	4	Primary Education	In-service	31
2	IT in education	5	Pre-primary Education	In-service	17
3	Educational Technology	1	Pre-primary Education	Pre-service	23
3	IT in education	2	Primary Education	Pre-service	19

*This group of student took part in the study for 2 terms.

4.3.3 Curriculum design of the main study

The study was designed as action research. It was an enquiry undertaken by the researcher to improve instruction. As illustrated in the table showing the sample of the study, the action research cycle had been repeated three times including the pilot study. There were a number of key changes of the overall plan. Changes in the action research cycle two included the requirements of students to provide three pieces of feedback to their peers; allocating time slots in class to discuss the earlier draft of learning portfolio and the group project; provision of a learning portfolio template; sharing of students' journal entry in class; encouraging students to view learning portfolios of a previous cohort. For cycle three, the research plan was basically the same as that of cycle two. A few refinements included reflective questions in the learning portfolio. These questions seek students' perception of the value of receiving feedback from peers and tutor through blogging. In addition, the meaning of writing reflective journal was explained carefully to students. Reflective journals were illustrated to students using their journal entry in the last semester. More

customized feedback from tutor was provided to students.

The notion of *assessment for learning* was infused into the courses, namely: computer applications, educational technology and information technology in education, taught by the researcher. An illustration of the main idea and procedure of implementing the concept of *assessment for learning* through technology in a course was described in this section. The objectives and course outlines of these three courses are attached in the appendix A. The role of technology is described in next paragraph while that of *assessment for learning* concept follows next.

Blog was used as a channel for communication between tutor and students. Students might list their questions or opinions in the journal. Besides, it also served as a platform for students to reflect on learning and to interact with one another. WebCT, an online learning system, was used as a repository for students to keep students' class exercises or for the tutor to examine their work done in class. Besides it was used as a platform for the tutor to distribute course content to students. Students were requested to produce a learning portfolio using common office software PowerPoint. Functions in the PowerPoint enabled students to assemble and organize various files together.

Summarizing a huge research literature, Black (2000) showed that the use of *assessment for learning* principles produces learning gains with effect sizes of between 0.4 and 0.7. This gain was larger than those produced by some other significant educational interventions. *Assessment for learning* ideas such constructive feedback, questioning, self-assessment and peer-assessment were put into practice and found to be conducive to learning (Black, Harrison et al. 2003). Therefore these ideas were implemented in these courses through the use of online journals and the construction of portfolios.

Constructive feedback – In addition to the classroom environment where students had the chance to interact with both tutor and peers, they were provided with other opportunities through blogs. In a blog, students received feedback from two main sources: classmates and teacher. Students were required to provide feedback to their peers on at least three occasions. Moreover, it was possible for members of the

general public to provide feedback to students. Most students would receive oral feedback from their tutor as part of the classroom instruction given at the beginning of next lesson. The tutor also responded to their journal by writing on their blog before next lesson. Special sharing sessions related to the course were organized in the middle and at the end of the course for students to have comments on the course and their work – namely on their portfolio preparation and group project. As for students' assignment or group project, students were encouraged to obtain feedback from tutor and peers before submitting work for grading.

Self-assessment - Self-assessment was considered as part of the teaching and learning strategies. Opportunities were incorporated into the course in various ways. Students were required to write weekly journals based on each lesson. They were allowed to assess their learning on the lesson and wrote their opinion on their blog. Reflecting on the experience of participating in class was a kind of reflection-on-action (Schon 1983). The act allowed one to evaluate one's experience and gain insights. Each journal must be at least 50 words long. Assessment goals and grading criteria were given to students in the first lesson. It was hoped that this facilitated students' assessment of their assignment or group project. The *Second Thought* session and reflective questions in the portfolio provided students with opportunities to reflect and evaluate their overall learning experience of the course (refer to section 4.3.5.3).

Peer-assessment – The journal published on the blog environment provided an additional channel for students to interact with one another because students could read their peers' journals using a computer at their time of convenience. This should increase the possibility of students understanding one another better and should encourage participation in the collaborative learning environment. The lesson from the pilot study showed that the availability of collaborative tools would not guarantee appropriate uses. As a result of the pilot study, students in the main study were required to provide feedback to their partners at least three times during the course. The number was selected instead of others because the researcher wanted to ensure that students read their peers' journal and at the same time did not want to impose an unreasonable burden of work on students. In addition to the online journal, students were encouraged to provide feedback to their peers' work during the special sharing

sessions organized in the middle and end of the course.

Questioning – Questioning was a powerful technique in a lesson. The tutor of the courses often motivated students to learn through questions in class and sometimes in students' online journals. Students were also encouraged to ask any question which they had doubts about either in class, through email, or even via the online journal.

The above course design principles enabled the researcher to seek information about student learning and teacher teaching. The researcher modified her pedagogy in the light of evidence from her students and from self-evaluation of classroom practice. The following table lists in detail the schedule of the work done by tutor and students respectively.

Table 4-2. Implementation schedule of the study showing both the work of teacher and students in a course

Schedule	Teacher	Students
1 lesson	Course overview Assessments of the course with criteria given Provide sample portfolio Pre-test of students' computer capability – self-evaluation	Aware of the nature of the course and its assessment scheme Write journal Answer questionnaire about their computer capability
2 – 6 lessons	Provide guiding questions for students to reflect on each lesson Read students' weekly journal Provide oral feedback in class Provide written feedback to specific students Analyze pre-test questionnaire	Reflect on their weekly lesson Write journal Raise questions if they have any Response to their peers' journal Prepare a learning portfolio
7 lesson	Read / Listen carefully to students' learning portfolio and group assignment Provide specific comments on how to improve on their work Interim questionnaire on the use of blog, portfolio construction and the course	Write journal Present learning portfolio Submit the first draft of group assignment Provide feedback to their peers Answer questionnaire about the use of blog, portfolio construction and the course
8-13 lesson	Read students' weekly journal Provide oral feedback in class Provide written feedback to specific students Provide specific comments on how to improve on their work Analyze interim questionnaire	Write journal Present group assignment Provide feedback to classmates
14 lesson /one week after last lesson	Mark and grade portfolios and group assignments	Submit portfolio Submit group assignment Write journal

4.3.4 Operational research questions

The study began with an exploration of how to improve the educational practice faced by the researcher. It was found in the pilot study that the use of technology had a possibility to enhance the learning and teaching environment. It was also possible to implement the concept of *assessment for learning*. The main study enabled the researcher to conduct the study more systematically with more students because the researcher already had an experience in it and the necessary data collection tools were available. Students' computing background was one of the most important indicators for the teacher to plan for the instruction. The first group of questions of the study was those related to the computing background of students. With respect to the curriculum design, there were three areas which were the main concerns of the study. They included the feedback provided to students, the self-assessment of students and peer-assessment. Feedback provided to students could be operationalized in terms of students' communication with tutor and peers. Self-assessment of students which in one sense provided evidence of their reflective thinking development could be identified through the online journal and the learning portfolio. Peer assessment was embodied in the participation in the collaborative learning environment. Besides, it was also important to elicit students' view on the experience of using a blog and the course so as to provide evidence for the researcher to enhance future courses. Therefore the operationalized research questions of the study were grouped into the following categories:

Table 4-3. Operational research questions of the study

Categories	Specific research questions
Computing background	When did students start learning to use the computer? How long have they used computers? What are their purposes of using computers? Are students interested in using computers? How do they rate their computer ability? With which software do they feel more confident?
Constructive feedback	What do they communicate with the tutor? What is their perception of the value of tutor feedback? Do students use blog as a tool for communication with the tutor? What is their perception of the value of peer feedback?
Self assessment	Do students engage in reflective processes when using blogs? And to what extent do students reflect? Are they becoming more insightful over time? Do all students engage in the process of reflection when writing online journals? What are the characteristics of students who engage in reflective activity? Is there any evidence of self-reflection in the students' blog entries? Do students reflect using portfolios? What are the assessment criteria which students apply to judge their achievement in class?
Peer assessment	Do students use blog as a tool for communication among peers? What are the patterns of their interaction? Are there more positive or negative emotions?
Evaluation of the study	What are the students' perceptions of the use of blogs? What are the students' perceptions of the *assessment for learning* based lessons?

4.3.5 Data collection

With respect to the research questions above, a mixture of both quantitative and qualitative data collection methods was used. Since students taking the courses were required to write a reflective entry on each lesson in their course journals, the journals provided a rich source of data for the researcher to analyze students' reflective thinking. Besides, the journals served as an opportunity for students to engage in self-assessment. Another source of data was from learning portfolios which were also part of the course assessment scheme. The learning portfolios provided evidence about students' reflective thinking from another perspective. The journal showed the developmental progress of students' thinking, while the learning portfolios depicted an overall view of students' thinking. These data collection tools were designed and embedded in the curriculum in advance. Additional tools to

collect students' background information, their perceptions about the use of blog and their experience on the *assessment for learning* course were obtained separately during the course. The purpose of each data collection tool with the time to collect data is given in the table below:

Table 4-4. Purposes of data collection tools with the time to collect data.

Data Collection Tools	Purposes	Time
Student Computing Background Questionnaire	To obtain general background information of students especially their knowledge in computing	1st lesson
Blog Questionnaire	To obtain students' views on their practice of using online journals	7th lesson
Course Review Questionnaire	To obtain students' view on the *assessment for learning* based lessons To review the coming lessons	7th lesson
Weekly Journal	To serve as a source for investigating students' reflection and communication content with tutor and peers	Weekly
Learning Portfolio	To serve as a source for investigating students' reflection To seek students' view on the value of peer and tutor feedback	At the end of the course

4.3.5.1 Survey

Surveys are appropriate for research questions about self-reported beliefs and behaviours of people (Fink 2003). Besides, surveys are effective and manageable for one researcher. They can be sent to large numbers of respondents with ease. Data collected is easy to code and analyze. In order to ask students about their beliefs about their IT capability, their behaviours of using online blogs and their perceptions of *assessment for learning* in the course, three questionnaires were designed for respondents to read and mark answers by themselves. Fink (2003) suggested three principles of effective survey questions to be clear, simple and designed from the perspective of respondent. These were followed in the design of questionnaires used in the study. The purpose of the surveys was to collect information for the researcher to design and plan instruction suitable for students' learning.

Questionnaires to collect students' background information were designed for pre-service teachers and in-service teachers separately. This is because their

backgrounds are different. Pre-service teachers tend to be affected by the high school experience and their daily life. The in-service teachers' attitude toward computers is greatly influenced by the working context. In addition, the purpose of the questionnaire is not to compare different groups of students but to seek information to better support the teaching and learning environment. The survey is attached in Appendix B. Pre-service teachers are given the same questionnaire without questions 8 to 20. A total of seven questions are set in the questionnaire. The introductory question is where the student graduated in high school. The second question is when the student started learning to use computers. Questions follow about the actual experience of using computers and their intentions concerning computer use. The answers to these questions can be used to explore the extent to which students' background relates to students' existing capability and interest in computers, (see. question five and six of the questionnaire). Question seven is about the computing skills of students. It consists of a set of 20 of items, with scales in the Likert format for student to rate their familiarity in different technical skills. These skills are considered to be necessary in a technology-based society or to be covered in the course.

For in-service teachers, in addition to the questions mentioned above, they have to answer questions related to their teaching context. For example, what are the subjects and classes that they are teaching now? How long is their teaching experience? Does the school provide necessary support in terms of facility, software and policy for them to integrate IT into teaching? Does the teacher apply computers in their teaching and how is the computer being used? The data collected are quantified numbers which provides a general picture of students' computer ability, their background and current behaviours with respect to the school context.

In order to improve the course practice, students were invited to provide feedback on the course using the survey listed in Appendix C. The obtained information provided evidence for the researcher to adjust the course content, teaching style or the strategy in class if necessary. Interim questionnaires about students' views on 'the experienced curriculum' and their perceptions of blogs were given to students at mid-term time. For the experienced curriculum, there are about 11 statements and 4 open-ended questions. The first question is designed to see if the proposed content

meets their expectations. Questions two to seven are about the assessment issues. It asks if the various assessment schemes and criteria are clearly understood, and if students are satisfied with the assessment methods. Then students are asked if they are satisfied with the taught course content and the teaching style of the tutor. Students' view on the knowledge acquired is sought as well in question 10 and 11. The four open-ended questions are for students to express their opinions in detail about this questionnaire, the problems encountered in the course, and any suggestions about the coming lessons. Since this questionnaire is collected during mid-term, the teacher can revise or adjust the curriculum based on the feedback provided.

Referring to Appendix D, questionnaires designed to reveal students' patterns of working and perceptions of using online journals are covered in 13 statements. Each statement consists of a 5 point Likert scale ranging from strongly disagree, disagree, neutral, agree and strongly agree. Questions are designed based on the informal data collected in the pilot study. The questions are categorized into different groups beginning with students' familiarity with using computers and the perceived user friendliness of the blog environment. Then students' practices of distributing ideas online and lesson journals form another group. Their frequency of reading self reflections, peers' reflections and responding to feedback are collected to compare and contrast with their expectation of receiving feedback from both peers and tutor. The final group of questions is a set of direct statements about the value of blogs as a tool for communication and reflections. Two open-ended questions were designed for students to raise problems which they encountered in the online journal writing practice and their opinions about the value of online journal writing.

Responses were anonymous. Responses in the questionnaire were self-reports of students' practices and values. Therefore there is the possibility of a discrepancy between what students say they do, and what they actually do. However, the data collected from portfolios and the counter feature of online journal both suggest that their responses are honest. That is both responses in the questionnaire are compatible with that of the data shown in the portfolio and the counter of online blogs. Data were coded and analyzed with SPSS to obtain the descriptive statistics of students' perception of using online journals, their view on the experienced curriculum and

their background information. Means and standard deviation are calculated. Students' view of blogs as a tool for communication and reflection is calculated. Data from different groups of students are compared to see if there is any difference in their frequency of reading and responding to online journals.

4.3.5.2 Online journal

Online journals collected through blogs provided another source of data used in this study. Students were requested to write a reflective online journal for every lesson in the course. Online journals were introduced to students as a new tool which they might use in their learning and teaching. For example, in the Information Technology course, in-service teachers might use a blog as a bulletin of class activities or for announcements, if they know how to use blogs. In the case of the current study, the researcher used blogs as a communication tool with students. Students were required to reflect on their learning in each lesson in the form of blogging. The rationale of asking students to write on each lesson is that the researcher believes it requires persistence to develop reflective thinking.

Writing journals was part of the course assessment scheme. It accounted for about 20% of the total mark. Clear instruction was given to students that if they attended a lesson and submitted a journal of at least 50 words in time, they would be given one mark. In order to encourage students writing online journals, half a mark is given even if the student was absent but wrote a journal. Therefore the practice of writing journal occupied 13% to 14 % of the total course mark depending on the length of the course. The remaining 6% to 7% was to mark students' feedback given to their peers based on the number and the nature of feedback responses. As for the content of the journal, there was no restriction because the researcher hoped that content in the journal was what students wanted to communicate with both their tutor and their classmates. The researcher did not want to guide students to answer her researcher questions by providing guiding questions for students. It might generate biased contents in the journal. Guidance was given to students at the beginning to warm them up. If every student writes a journal for each lesson, there is a total of at least 650 words for the whole course. There are 135 students so a potentially rich text of students' thinking in more than 80000 words is collected. The content of feedback,

and the number of feedback comments provided both quantitative and qualitative data for analyzing students' communication patterns.

4.3.5.3 Learning portfolio

The learning portfolio which all students had to submit at the end of the course was another source of data for the current study. The purpose of including learning portfolios in the assessment scheme of the course was for students to have a collection of evidence which showed their growth over time. Besides, a chance for students to engage in reflective practice was given in the process of portfolio construction. In terms of technical skills related to the course, students should have the ability to collect and manage many files in an organized way using tools which they know.

Learning portfolios took up 25% of the course marks. Assessment was based on the criteria of comprehensiveness, creativity, reflectivity, technical skills and simplicity. Each criterion carries equal marks. The first criterion is to check if students have included all the exercises that they did in class or any other which they practiced at home by themselves. The second one sees how creatively they presented their portfolio content. The third one can be accessed through the objectives that students included in the portfolio, the *Second Thought* section and the answers to the reflective questions. The technical skill criterion checks if students could complete the task using certain software. The final criterion is to check if it is easy to navigate the portfolio. These criteria were given to students at the very beginning of the course. Students had to submit the portfolio at the end of the course.

It was found in the pilot study that students did not understand the exact requirements for the learning portfolio and many of them composed it only just before the submission time. In the main study, a template of a learning portfolio was given to students in the first lesson in order to minimize the feeling of being overwhelmed on portfolio construction. (Dutt-Doner and Gilman 1998; Lyons 1998). Further, samples from previous students' work were shown to students. In order to encourage students to engage in a continuous process of portfolio construction, students were requested to submit their progress at mid term. Students were enabled

to evaluate their progress and reflect periodically as Karp and Huinker (1997) observed. As with the case of online journals, a special period in the middle of the course was allocated to provide comments on students' working portfolio and to clarify any misunderstanding on the requirements.

Referring to Appendix E, a learning portfolio which meets the course requirement should have four sections. First, it should have clear objectives. Second, it includes all the artifacts done in class or after class. So the online journal is part of the artifacts in the learning portfolio. Third, if students have any words to express when they review their work, they might add a *Second Thought* section. The final section is to answer a list of reflective questions. These four sections represent the characteristics of portfolios as mentioned in chapter 3.2.1. It can be noticed from these requirements that students have to collect work done in classes, manage and present those files in an organized way. The reflective nature of a learning portfolio is visualized through students' objectives of compiling portfolio, *Second Thought* section and answers to reflective questions. If students put effort in these sections, they have to take time to read and think before they present their ideas to others. They will probably be involved in the process of reflection. Indicators such as students provided appropriate objectives or they included a *Second Thought* section in the learning portfolio, suggest that they are engaged in reflective practice. Further, their answers to a list of questions provide evidence about the experienced curriculum.

To summarize, the sources of data collected include the weekly journal on a blog, three surveys and a learning portfolio. These three sources of data collection provide rich and triangulated information related to the research questions. However, the collected data might not be complete. Students' collaboration among peers, their practice of self-assessment and reflection might be happened in situations where technology does not capture. Students might be selective to which information they want to disclose online.

4.3.6 Description of data analysis

Both quantitative and qualitative data were collected from the data collection tools

above. Most of the quantified data were from the three surveys about students' background, their perceptions of the use of online journals and the experienced curriculum. These data were first typed, coded and analyzed by statistical software, SPSS version 13. Descriptive statistics of students as a whole and in different courses were calculated separately to see if there is any significant difference. Means and standard deviations were calculated as well. Students' view of blogs as a tool for communication and reflection were calculated. Data from different groups of students were compared to see if there was any difference in their frequency of reading and responding to online journals.

Open-ended answers were coded using text analysis software, ATLAS.ti. For example, if a student wrote that she did not know how to put pictures in her online journal, this difficulty was coded as a technical problem which students encountered in writing the online journal. A family of super codes was established if more than one topic was described as being difficult in writing the online journal.

Rich information on students' learning was collected through blogs. Since most of the collected data were typed by students themselves, the researcher does not have to type or transcribe the data. Data analysis began directly. The researcher only had to translate the data into English format for reporting purposes. As mentioned in the previous section, there are about 80,000 words of text to be analyzed, the researcher had to limit the range of data analysis due to the limited time and resources available. Hence, a selected version of the overall journal was analyzed. Students who were enrolled in the Computer Applications course were selected because there were two groups of students taking the same course. It would be interesting to explore if senior students were better than junior ones. Besides, among these students, some of them underwent the experience twice because they were enrolled in two courses. The researcher is interested in knowing if there is any great improvement in their reflective thinking development as a result of previous experience. Therefore the journals of these two groups of students were analyzed and reported in the thesis. There were more than 158,792 words of text in these students' journals.

With reference to the research questions, there are three main themes which are central to the researcher's interests: namely the reflective thinking of students, the

communication between tutor and students and the content of communication among students. Journal content serves as the main source for analyzing the reflective ability and the communication channel between tutor and students. Content analysis is used as a data analysis tool. Content analysis is selected for several reasons (Fraenkel and Wallen 2006). First, most of the data are text-based. Second, it allows the researcher to analyze students' reflective thinking longitudinally with ease. Third, it does not entail participants in the study having to take the researcher into account. Fourth, it is a highly flexible method. Weaknesses of content analysis are taken into consideration when analyzing and interpreting data. First, the text collected has to be checked for its authenticity and credibility. For the issue of authenticity, the journal provided by students is checked to see if it is about the lesson. For most of the students, their journal content is related to the lesson. Only a few students wrote irrelevant items. For example, a student wrote '... and then in Chinese class, I slept for some times but was woken up by friends soon. O My God... After school, I went to tutorial classes for quite a long time and had fun with friends.. haha... I left for home at 9:00pm... Ai! I expect to attend classes tomorrow.' For this text, it does not tell much about students' learning in a lesson. It is neither coded as reflective theme nor communication theme. It is given with a code 'others'. For credibility issues, measures have been taken in advance to avoid any distortion of content given by students. For example, the research strictly follows the assessment criteria given to students in the first lesson. Besides, guiding questions related for students to reflect on is not provided to students in most of the lessons.

Reflective thinking - The learning theory of Boud (1994) serves as a coding scheme for reflective thinking. A reflective process is divided into three stages: namely returning to experience, attending to feelings and the re-evaluating of experience. The first two stages help learners to recall the experience and to apprehend their personal feelings towards that experience. Therefore the quality of reflection is superficial. During the process of re-evaluating experience, the learner would enter the deeper levels of reflection through relating the new knowledge or attitude gained from the experience with their existing knowledge or they might discover the inconsistency of the knowledge or attitude. They might also re-evaluate their previous knowledge. Some might seek relationships or gain insights from the new experience. This is the level of integration. The deepest of level of reflection is the

validation of the new knowledge or attitude to the value system that one has. As the change in value system is not easy to achieve within a short period of time, it is not expected to have a great number of occurrence in students' journal.

The contents of students' journals were read through several times to look for sentences or paragraphs which meet the criteria given in the coding table. The coding principles of students' journals are based on the work of Wong and his colleagues (1995):

1. Coding was only valid with evidence or substantiation.
2. Coding had to be supported by textual data. Interpretative speculation was not accepted.
3. Using quotes from literature to illustrate one's own experience was amenable to coding. However, quotes showing only textbook knowledge without the integration of personal knowledge were not coded.

The coding scheme based on Boud's learning theory of reflective thinking is shown in Table 4-5. There are 15 codes representing different stages of reflection. The corresponding examples obtained from students' online journal are listed as well. The detailed specification of codes helps the researcher to code the text consistently. Student's reflective thinking is grouped and categorized into four levels, namely recollection, attending to feeling, associations and outcomes of reflection. That is the stage of Boud's learning process is divided into two levels of reflections. The integration, validation and appropriation are grouped into one level called outcome of reflections.

Table 4-5. Coding scheme of reflection in the learning process based on Boud's model with examples from students' online journal.

Process	Code	Descriptor	Example from students' journal
1. Returning to experience			
	0	The collection of the salient events	In this lesson, we learnt Microsoft Word. As I have learnt it before, I can do it very quickly. After that, we learnt Microsoft Excel, it was learnt before. Finally Regina reminds us to keep a copy of our work and not to delete it. It's lucky that I save them otherwise I have to do it again at home.(CA-S25-L3)
2 Attending to feelings			
	1.1	Utilization positive feelings (recollection of good experience, attention to pleasant aspects of the immediate environment, anticipation of the possible benefits to be derived from the processing of events)	It is lucky that I take notes otherwise I will forget it very soon. We just practice easy problems but not difficult ones. The exercises enable me to recall my memory. I feel so happy. (CA-S32-L5)
	1.2	Removing obstructing feelings	Today, we learnt PowerPoint. It is so troublesome! At first, we did simple animation. It is not so difficult. After that, we have to use PowerPoint to show the concept of comparing areas. It is so hard to fix the positions. Besides, the procedure is so repetitive that I find it very troublesome. ◦ (CA-S38-L4)
3 Re-evaluating experience			
	2 Association		
	2.1	Relating new ideas, knowledge & feelings with existing knowledge and attitudes	I am used to looking for information using yahoo. I seldom use the search engine, Google. I just know that online databases also provide lots of useful information to us to search. (IT-S16-L3)
	2.2	Discovery of inconsistency between old attitudes or knowledge and new one.	There is a great difference in the animation function of PowerPoint version 2000 and 2002. The function if new version is more complex but it enables one to do different attractive and interactive effects. (CA-S03-L4)
	2.3	Re-assessment of old knowledge to accommodate new information	I just know to look for information by Google and Yahoo. They always list several hundred or even thousand of web sites. But most of the data are unrelated to keyword entered. It takes times to sort things out. The experience is so much trouble. The academic database provides an easy and reliable method of searching academic articles. (IT-S03-L3)
	3. Integration – outcomes of reflection		
	3.1	Seeking the relationships that have been observed through association	Inspiration is like an interactive blackboard. It is simple to use. I find it is easier than Excel and PowerPoint because only a few icons are needed to operate it. In order to use it properly, I just need to understand a few principles and practice one

			or two times. (CA-S12-L5)
	3.2	Arriving at insights into the material which we are processing	In the practice of Flash exercises, I feel the flexibility of Flash. For example, there are different ways to do the animation effect required in exercise 4. There is no standard method to do it. We just need to use our brain and think! (CA-S01-L10)
	3.3	Drawing conclusions	Even though IT can solve certain problems, it requires a high degree of support and the requirement from teacher also increases. The effect might not be the most effective. On the other hand, traditional teaching has its own value. Teachers need to know which approach to use. (IT-S01-L5)
	4 Validation – outcomes of reflection		
	4.1	- Testing for internal consistency between new appreciations and existing knowledge or beliefs	Even though the online database is quite useful in searching information, I still think that we can rely too much on Internet and there are lots of references available in library. (IT-S05-L3)
	4.2	- Trying out new perceptions in new situations	In fact, I might apply the knowledge learnt in class to my work. Since I am teaching activity class in school. I can prepare notices using mail merge, prepare the timetable using Excel and analyze students' academic results with functions in Excel. It systemizes and improves the efficiency of my work. (CA-S01-L3)
	4.3	- Reappraise the situation so as to make new decisions	I have been studying computing in university for three weeks. I used to hate computer lessons but it has become my favourite lesson now. Even though I have learnt most of the content before, I have forgotten it as well. The relaxing atmosphere in class and the time for practice during class drive me to do it by myself. I am becoming actively engaged with this course. (CA-S39-L3)
	5 Appropriation – outcomes of reflection		
	5.1	New knowledge becomes part of our value system	Concept map is so useful. It can be use in different contexts such as brain storming and analyzing concepts. Therefore I will use it in projects work later. (IT-S02-L11)
	5.2	Enters into our sense of identity	When we become teachers in future and teach information technology, we need to foster students' critical thinking (IT-S14-L3)
	5.3	Significant feelings which give rise to strong emotions to learning	No example

Communication pattern –The online journal environment serves as a channel for communication among students, tutor and their peers. The communication patterns of students were analyzed from several perspectives, namely the journal content, the number of feedback responses received, the number of comments provided and the content of their feedback. The journal content and the feedback content were scanned through the online journals. They were coded based on the manifest meaning of the journal content. Frequency of occurrence of codes were calculated and reported. The number of feedback responses received, written and the levels of interactions are recorded and analyzed.

Portfolio production offered another channel for students to engage in reflective process. The aim of the learning portfolio, the *Second Thought* section inside the journal and the reflective questions formed indicators which show whether students engage in reflective process or not. Students' portfolios were being checked to see if students put effort in the writing of the aim of portfolio and *Second Thought* section. Answers to the reflective questions were analyzed by content through coding and categorizing of data. Prominent themes related to the study were identified and compared with evidence from blogs.

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4.3.7 Validity and reliability issues

Both validity and reliability are important for the design of the study and interpretation of information collected. Validity is concerned with the appropriateness, meaningfulness, correctness and usefulness of the inferences made by the researcher whereas reliability refers to the issue of consistency, i.e. whether the same results can be obtained if it is done at different time or by different persons (Gay and Airasian 2003). As the study was conducted three times including the pilot study, the research design of the study was likely to be systematic and reliable. This is because action after each cycle was evaluated and revised accordingly to refine the whole process of research.

In the implementation of the study, most data were collected from online journals. Since students knew that the data provided in the journal was a form of communication with tutor, they would probably provide honest information related

to their learning. Besides, different methods were used to minimize the effect of researcher bias. They were as follows:

- Both positive and negative opinions were provided for students to select in the questionnaire survey.
- Marking criteria of online journal was not based on journal content so that students were free to write their opinions.
- Reflective questions which the researcher was highly interested in were not provided for students in most of the lessons. Instead students were given the freedom to write whatever they wanted to share with tutor.

In addition, most of the data were related to students' perception and behaviour. This information could be validated from different data collection tools.

On the reliability issue, the content analysis of student journals had the greatest possibility of having inconsistent result especially in the analysis of quality of reflection. This is because reflection is a kind of latent knowledge. A specific coding system based on the existing literature was applied so it increases the chance of achieving consistent results. Since the researcher was the one involved in the context of the study, the interpretation of the data was done by the researcher only. In order to minimize the threat of researcher bias, students' names were coded before data analysis. Data analysis and interpretation process was done twice. This also minimizes the chance of different interpretations of data from different scorers. As a further check on the validity of the interpretation, the results of the study were sent to students for validation.

4.3.8 Ethical issues

Since this research is part of the researcher's normal teaching, students just have to behave as they normally do. A course description is given to students to provide an overview of the course to students, e.g. the topic planned, the requirements of the course and the assignment needed. The purpose of the course is also the purpose of the study so it is also introduced to students in class. The data collection tools which are employed in the study are beneficial to students' learning. At least, they can have documentation of their learning after the course. They just apply the knowledge learnt in the course to do these assignments. There is no extra work required by

students. Written consent about the analysis of their journal with respect to the questions of the current study is listed in Appendix F. It is obtained during class at the end of the course. Students are free to withdraw their blogs from the analysis. Students were assured that their withdrawal or the contents of blogs would not affect their academic results and that the data would be coded to achieve anonymity. Most of the students agreed to let the researcher to analyze their blogs.

4.4. Summary

Action research was selected as the methodology of the study because it is part of the teaching and learning process of the researcher to improve the educational practice. A systematic research design is outlined in the chapter to seek information helpful for the improvement of the teaching and learning environment. Each cycle of the action research enhances the research process progressively. This research study has the advantages of using minimum resources to triangulate the required data and all the actions are well explained. The research design is specific to the need of the research context emphasizing technology. However, it should be noted that student's practice of self-assessment, reflection and collaboration might not be fully captured through technology. Besides, the translation of the data collection tools into English might be a problem.

Different data sources are used to provide the results in the next chapter. The next chapter presents the results based on the four groups of operational questions, namely students' computing background, students' perception of the online journal and the experienced curriculum, students' reflective thinking and their communication patterns.

Chapter 5. Results

The objective of this chapter is to present results of the study in a logical way. In order to implement the concept of *assessment for learning* with the support of technology, various tools were designed to collect the required information. Collected data was used to plan, revise and verify the study. Analyses are grouped into five sections with respect to the research questions listed in previous chapter, namely computing background information of the participants, students' self-assessment practice, peer assessment in terms of feedback given by classmates, the constructive feedback provided to students from the tutor, students' perception on the use of blog and the experienced curriculum based on the concept of *assessment for learning*.

5.1. Computing background of the participants

5.1.1 Results obtained from questionnaire

One hundred and fifteen students responded to the survey questionnaire about their computing background. The response rate is about 95%. Such a high response rate is due to the fact that the questionnaire was distributed to students in class and collected before class dismiss. Some students were absent on that day so they did not answer the questionnaire. Participants in the study included 69 pre-service teachers and 46 in-service teachers. They came from thirty different high schools representing most of the high schools in Macau. Data in result tables do not add up to 100% because there were a number of students absent on the date of data collection. Another reason is that students did not fill some of the data.

Table 5-1. Year that pre-service teachers started learning to use computers (mean = 2.72;standard deviation = 0.45)

Code		Frequency	%
2	3-5 years ago	19	27.5
3	6-9 years ago	50	72.5
	Total	69	100.0

Table 5-2. Year that in-service teachers started learning to use computers

(mean = 3.41;standard deviation = 0.617)

Code		Frequency	%
2	3-5 years ago	3	6.3
3	6-9 years ago	21	43.8
4	10-12 years ago	22	45.8
Total		46	95.8

Table 5-1 and Table 5-2 show when the pre-service teachers and in-service teachers started learning computer respectively. All pre-service teachers learnt to use computers in the basic education system either in primary or secondary level. Many of them (approximately 72%) might have started learning computer in primary school. As for in-service teachers, the question of when they started learning to use computers had to take their teaching experience into consideration. Table 5-3 shows the teaching experience of in-service teachers. It can be deduced that most working teachers also learnt to use computers in their secondary school level. A few of them might start learning to use computers after they worked as a teacher. The result resonates with the computer education development of Macau in recent years. As presented in the introduction chapter, the Macau government boosted IT education since 1999. Most schools in the Macau basic education system have established computer courses for students to become computer literate. Some schools in Macau even advertise that their computer education starts from kindergarten. Now most of the schools in Macau have computer classes once a week.

Table 5-3. Teaching experience of in-service teachers

(mean = 2.07;standard deviation = 1.083)

Code		Frequency	%
1	below 2 years	17	35.4
2	2 to 5 years	16	33.3
3	5 to 10 years	7	14.6
4	10 to 15 years	5	10.4
5	15 to 20 years	1	2.1
	Total	46	95.8

Table 5-4. Participants' reasons for using computers

Reasons	Pre-service teacher (%) N=69	In-service teachers (%) N=46
Seeking information	89.9	85.4
Entertainment	88.4	75
Making friends	36.2	25
Learning	75.4	62.5
Communication	82.6	75
Teaching	1.4	81.3

A list of reasons for using computers was provided for students to select from. The list included seeking information, entertainment, making friends, learning, communications and teaching. Table 5-4 shows participants' reasons for using computers. Pre-service teachers and in-service teachers have similar reasons for using the computer. For example, most of them use computers for seeking information, entertainment, making friends, learning and communication. But the order of preference differs slightly between these two groups of teachers. For example, in-service teachers use computers to seek information and for the purposes of teaching whereas pre-service teachers are seeking information, entertainment and communication. Results obtained echo with the study done by Cheong and Wang (2005).

Table 5-5. Interest of in-service teachers and pre-service teachers in computers

	In-service teachers		Pre-service teachers	
Interest in computers	Frequency	%	Frequency	%
Uninterested	1	2.1	3	4.3
Neutral	30	62.5	35	50.7
Interested	12	25	24	34.8
Very interested	3	6.3	7	10.1
Total	46	95.9	69	99.9

Table 5-5 shows the interest of participants in computers. It can be seen that even though students have been learning about computers for quite a long period, more than half of the students, both in-service and teacher candidates reported that their interest in computer was just neutral. For in-service teachers, only one third of them were interested in computers. The case for teacher candidates is slightly better as the proportion of interest in computer is about 45%. This phenomenon might be explained by the past experience of these teachers in learning about computers and their school context. Teachers reported that their learning experiences around

computers were less than satisfactory. For example, they had to learn programming which they found too hard to understand and had little chance of application. It might also be due to the poor support of the schools in terms of facility, policy and software etc. to help teachers apply computers in their teaching.

5.1.1.1 Computer literacy of the participants

ICT literacy refers to the capability of using digital technology to access, manage, integrate, evaluate, and create information (The International ICT Literacy Panel 2002). It is a broad concept involving critical application of both skills and knowledge of technology. The term computer literacy in the context of this study is only part of the above definition. It refers to the mastery of technical skills, mainly that of using computer applications. The self-perception of students' familiarity with using computers in general is shown in Table 5-6. Only a small portion of all students (6% and 14 % representing in-service and pre-service teachers respectively) are confident enough to rate themselves as familiar or very familiar. The remaining students consider themselves as average. It should be noted that 25% of pre-service teachers consider themselves to be unfamiliar with using computers. These figures are unrelated to the number of years that participants have learnt or used computers. An in-depth study of this phenomenon is interesting.

Table 5-6. Familiarity of in-service and pre-service teachers in using computer

In-service teachers (mean = 2.98, standard deviation = 0.505);
Pre-service teachers (mean = 2.9, standard deviation = 0.626)

	In-service teachers		Pre-service teachers	
Familiarity of using computer	Frequency	%	Frequency	%
unfamiliar	5	10.4	17	24.6
neutral	36	75.0	41	59.4
familiar	2	4.2	10	14.5
very familiar	1	2.1		
Total	44	91.7	68	98.6

Table 5-7. Familiarity of pre-service teachers and in-service teachers in basic operations of computer and Chinese input

	Basic Operation				Chinese input			
	Pre-service		In-service		Pre-service		In-service	
Mean	3.33		3.5		3.55		3.65	
Standard deviation	0.918		0.691		0.777		0.849	
Familiarity	Frequency	%	Frequency	%	Frequency	%	Frequency	%
very unfamiliar	5	7.2	-	-	2	2.9	-	-
unfamiliar	2	2.9	2	4.2	2	2.9	1	2.1
neutral	31	44.9	22	45.8	25	36.2	14	29.2
familiar	27	39.1	19	39.6	36	52.2	26	54.2
very familiar	4	5.8	3	6.3	4	5.8	4	8.3
Total	69	99.9	46	95.9	69	100	45	93.8

Table 5-8. Familiarity of pre-service teachers and in-service teachers in office software

	Word Processing				Excel				PowerPoint				Access			
	Pre-service		In-service		Pre-service		In-service		Pre-service		In-service		Pre-service		In-service	
Mean	3.62		3.8		3.04		3.02		3.25		3.2		2.26		1.96	
Stand deviation	0.688		0.619		0.716		0.745		0.695		0.885		0.98		0.729	
Familiarity	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
very unfamiliar	2	2.9	-	-	1	1.4	-	-	-	-			12	17.4	-	-
unfamiliar	-	-	-	-	12	17.4	11	22.9	10	14.5	10	20.8	37	53.6	12	25.0
neutral	22	31.9	14	29.2	40	58.0	24	50.0	32	46.4	21	43.8	14	20.3	25	52.1
familiar	43	62.3	27	56.3	15	21.7	10	20.8	27	39.1	11	22.9	2	2.9	8	16.7
very familiar	2	2.9	5	10.4	1	1.4	1	2.1	-	-	4	8.3	4	5.8	1	2.1
Total	69	100.0	46	95.9	69	100.0	46	95.8	69	100.0	46	95.8	69	100.0	48	100.0

Table 5-9. Familiarity of pre-service teachers and in-service teachers in installing computer assisted software and programming

	Install-CAI				Programming			
	Pre-service		In-service		Pre-service		In-service	
Mean	2.55		2.96		2.76		1.41	
Standard deviation	0.9		1.41		1.207		0.652	
Familiarity	Frequency	%	Frequency	%	Frequency	%	Frequency	%
very unfamiliar	4	5.8	4	8.3	6	8.7	31	64.6
unfamiliar	35	50.7	10	20.8	31	44.9	11	22.9
neutral	21	30.4	18	37.5	12	17.4	4	8.3
familiar	6	8.7	12	25.0	9	13.0	-	-
very familiar	3	4.3	2	4.2	9	13.0	-	-
Total	69	100.0	46	95.8	67	97.1	46	95.8

Table 5-10. Familiarity of pre-service teachers and in-service teachers in using web browser, homepage editing and email

	Using web browser				Homepage Editing				Email			
	Pre-service		In-service		Pre-service		In-service		Pre-service		In-service	
Mean	3.46		3.52		2.39		1.72		2.38		3.61	
Standard deviation	1.008		0.752		0.878		0.807		1.384		0.881	
Familiarity	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
very unfamiliar	5	7.2	2	4.2	9	13.0	22	45.8	4	5.8	1	2.1
unfamiliar	7	10.1	23	47.9	32	46.4	16	33.3	4	5.8	2	4.2
neutral	12	17.4	16	33.3	21	30.4	7	14.6	17	24.6	18	37.5
familiar	41	59.4	5	10.4	6	8.7	1	2.1	34	49.3	18	37.5
very familiar	4	5.8	2	4.2	1	1.4	2	4.2	10	14.5	7	14.6
Total	69	100.0	48	100.0	69	100.0	48	100.0	69	100.0	46	95.8

Table 5-11. Familiarity of pre-service teachers and in-service teachers in using discussion board, blog, WebCT and online chat

	Discussion board				blog				WebCT				Online Chat			
	Pre-service		In-service		Pre-service		In-service		Pre-service		In-service		Pre-service		In-service	
Mean	3.07		2.48		2.62		2.04		2.55		1.98		3.22		3.37	
Standard deviation	1.129		1.049		1.113		1.053		1.219		1..0		1.305		1.199	
Familiarity	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
very unfamiliar	6	8.7	10	20.8	10	14.5	18	37.5	10	14.5	18	37.5	9	13.0	5	10.4
unfamiliar	17	24.6	12	25.0	25	36.2	13	27.1	30	43.5	15	31.3	12	17.4	3	6.3
neutral	18	26.1	17	35.4	20	29.0	11	22.9	13	18.8	10	20.8	16	23.2	17	35.4
familiar	22	31.9	6	12.5	9	13.0	3	6.3	8	11.6	2	4.2	19	27.5	12	25.0
very familiar	6	8.7	1	2.1	5	7.2	1	2.1	7	10.1	1	2.1	13	18.8	9	18.8
Total	69	100.0	46	95.8	69	100.0	46	95.8	69	100.0	46	95.8	69	100.0	46	95.8

Table 5-12. Familiarity of pre-service teachers and in-service teachers with sound, image and video editing

	Sound				Image				Video			
	Pre-service		In-service		Pre-service		In-service		Pre-service		In-service	
Mean	2.54		2.15		2.67		2.26		2.48		1.78	
Standard Deviation	1.106		1.01		0.886		0.773		1.244		1.009	
Familiarity	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
very unfamiliar	7	10.1	13	27.1	3	4.3	7	14.6	16	23.2	21	43.8
unfamiliar	31	44.9	19	39.6	30	43.5	22	45.8	24	34.8	15	31.3
neutral	21	30.4	9	18.8	26	37.7	15	31.3	17	24.6	6	12.5
familiar	2	2.9	4	8.3	7	10.1	2	4.2	4	5.8	2	4.2
very familiar	7	10.1	1	2.1	3	4.3	-	-	8	11.6	1	2.1
Total	68	98.6	46	95.8	69	100.0	46	95.8	69	100.0	46	95.8

Table 5-13 Familiarity of pre-service teachers and in-service teachers with animation and multimedia production

	Animation				Multimedia			
	Pre-service		In-service		Pre-service		In-service	
Mean	2.68		1.89		2.38		1.85	
Standard Deviation	0.962		0.706		1.384		0.965	
Familiarity	Frequency	%	Frequency	%	Frequency	%	Frequency	%
very unfamiliar	7	10.1	14	29.2	20	29.0	21	43.8
unfamiliar	22	31.9	23	47.9	29	42.0	14	29.2
neutral	29	42.0	9	18.8	5	7.2	9	18.8
familiar	8	11.6			4	5.8	1	2.1
very familiar	3	4.3	-	-	11	15.9	1	2.1
Total	69	100.0	46	95.8	69	100.0	46	95.8

When computer literacy is viewed in terms of basic computer operations and common office software as shown in Table 5-7 and 5-8, students' self-perception of their familiarity of using these specific applications is more obvious. It is clearly indicated that students are more familiar with basic operations, Chinese input and word processing. In Table 5-9, the percentage of students who are familiar with spreadsheet, presentation, database software, software setup and programming is much lower than that for word processing. This might provide an explanation that students consider their overall computing skills as not so familiar with computer. For internet applications given in Table 5-10 and 5-11, pre-service teachers seem to be more familiar with using web browser, email, chat and discussion board than in-service teachers. This information is consistent with their objectives of using computers for seeking information and communications. However, both groups of students are quite weak in homepage editing, blog and online learning systems such as WebCT. This might be due to the fact that these technologies have just emerged within last several years and might not be available in their high school or working units. For multimedia applications listed in Table 5-12 and 5-13, the percentage of both in-service and pre-service teachers stating familiar is very low. These data seem to imply that participants of the study are general computer users. They are far from the ICT literacy standard as defined by the International ICT literacy panel.

In sum, many participants in the study revealed that their computer literacy is just general. They have more confidence in common software like word processing and basic Internet applications. There is still room for improving their computer literacy. Related to the main technology used in the study, most of the participants are not familiar with the blog environment as this technology emerged in recent years. A few of them indicate that they are very familiar with it. It is interesting that these students rate themselves to be very familiar. One explanation is due to the simplicity of blog. As for the learning environment like WebCT, it is used in the study for students to upload their weekly class exercises for tutor to view and for them to document their record. Most students are not familiar with it as well but the skills required are uncomplicated to master. Most students are quite confident in using PowerPoint so it might reduce the technical demands on participants to produce learning portfolios. This offers participants the opportunity to concentrate on the content and the organization which is considered to be more significant to the study.

5.1.1.2 IT situations in Macau schools

The following section provides more information about the IT situations in schools based on the response of in-service teachers. Teachers came from twenty-six kindergartens or primary schools in Macau. Table 5-14 shows the number of teachers teaching in every grade of primary and pre-primary education. It can be seen that participants in the study came from all levels.

Table 5-14. Distribution of in-service teachers teaching in kindergarten and primary education

	K1	K2	K3	P1	P2	P3	P4	P5	P6
No. of teachers	5	9	10	12	13	14	13	10	7

Table 5-15. Distribution of in-service teachers teaching different subjects

	Chinese	English	Maths	Computer	Integrated Science	Music	Art	P.E.	Religion	Theme
No. of teachers	25	22	24	10	21	18	21	13	3	12

Table 5-15 shows the distribution of teachers teaching different subjects. It can be seen that these teachers taught various subjects in school because most primary and kindergarten teachers were trained to teach all subjects in their teacher education training programme. Many of them taught core subjects like Chinese, English, Mathematics and Integrated Science.

Table 5-16. Distribution of in-service teachers integrating IT into various subjects

	Chinese	English	Math	Computer	Integrated science	Music	Art	P.E	Religion	Theme
No.of teachers	18	19	18	12	21	4	6	5	1	10

Table 5-16 shows the number of teachers who have integrated information technology into their teaching. It can be seen that many teachers did apply IT in their teaching. The adoption of new technology into teaching is often affected by availability of resources and the support of the school. Therefore in-service teachers were being asked about the IT issues in school environment. These include the teacher to computer ratios, school-wide IT policy and the availability of hardware, software, Internet service and technical support.

Table 5-17. Teacher to computer ratios in school

Teacher to Computer Ratio	Frequency	%
1:1	14	29.2
2:1	3	6.3
3:1	1	2.1
4:1	1	2.1
5:1	3	6.3
6:1	24	50.0
Total	46	95.8

Table 5-17 shows the reported teacher to computer ratios in school. More than seventy percent of the teachers share computers with colleagues. Their access to computers might be limited as many of them might want to use computers. Fifty percent of teachers reported that the teacher to computer ratio in their school is 6 to 1. Only twenty-nine percent of them can use computers freely. This might reflect that the IT resources in Macau schools vary a lot. This is not surprising as about 90% of schools in Macau are private schools.

Table 5-18. Teachers' attitude towards IT conditions in schools

	IT facility		IT-software		IT-bandwidth		Technical support	
IT conditions	Frequency	%	Frequency	%	Frequency	%	Frequency	%
no	1	2.1	2	4.2	5	10.4	2	4.2
a few	17	35.4	19	39.6	9	18.8	12	25.0
neutral	18	37.5	17	35.4	24	50.0	27	56.3
adequate	10	20.8	8	16.7	8	16.7	4	8.3
plenty	-	-	-	-	-	-	1	2.1
Total	46	95.8	46	95.8	46	95.8	46	95.8

Table 5-18 shows the IT conditions in schools. IT hardware in schools is not satisfactory. Only twenty percent of teachers consider that the IT facility in schools is adequate. The software and Internet bandwidth available for use are even worse. Technical support is also an important factor which affects teachers' motivation to use technology in class. Teachers do not want to waste instructional time for matters like setting up screens, installing software or fixing software problems. Their perception on the technical support offered by school is the lowest. Less than twenty percent of the teachers consider that resources and support in school is adequate.

Table 5-19. IT policy is implemented in school.

	Frequency	%
School has no IT policy	30	62.5
School has IT policy	15	31.3
Total	45	93.8

Table 5-19 shows the implementation of IT policy in school. It is shown that two-third of teachers reported that their school did not have any policy related to IT to support the development of IT in education. Only one third of them believed that their school had a school-wide policy to support IT development. One IT policy implemented by a school was to request every teacher in that school to design a lesson infused with technology in an academic year. The instructional design of the class would be served as teaching resources of the school.

5.1.2 Result obtained from online journal

Students also informed the researcher about their computing background through the online journal. This information cannot obtain through questionnaire. Hence, the information collected through students' journal helps to supplement the above data. The following scripts are extracted from students' online journals. In order to achieve anonymity, code is produced to help keeping track of the record. The first two letters of the code in brackets represent the course title. CA means Computer Applications course. IT means Information Technology in Education course and ET refers to Educational Technology course. The middle three digits of the code represent student identity, and the final two letters stand for which lesson it is from, e.g. L1 means Lesson 1, L3 means lesson 3.

> In fact, my computer knowledge is just superficial because I only used it in various situations like during class, test, in the examination and for assignment purposes. I won't use it at other times. (CA-S20-L1)
>
> In fact, I have learnt Word in junior high school but it was several years ago. Besides, I seldom apply the knowledge learnt. (CA-S23-L2)
>
> I have some concept on using the Powerpoint as we need to do presentations when we are in senior high school. (CA-S40-L5)
>
> Even though I have learnt most of the topics in the course, I forgot most of them because I learnt them in junior high school. (CA-S38-L1)
>
> For excel, I haven't learnt it before so I don't know much about it. (CA-S28-L3)
>
> I am afraid of doing a computer course because I am not familiar with using computers. (CA-S30-L1)

These above scripts represent most of the ideas which students expressed in their

journals. The first two scripts point out that students did not apply what they had learnt in class to their daily life. They learnt for the sake of examination or class. They did not relate the knowledge gained to facilitate their daily life experience. But one third of the students show that if they had been given authentic environments to apply their knowledge or skill, they still have some concepts years after. However, many students reported that they forgot most of the content that teachers taught them in high school. Some students were afraid of computers and considered themselves as 'computer idiots' due to their experiences in high school. The last script shows that the computer curriculum in Macau high school varied among different schools. For example, many students admitted that they had learnt office software such as word processing and spreadsheets in high school but there were also students who had not learnt any yet.

5.1.3 Summary

This section shows an overall picture of students' computing background. The computing background of the participants is obtained from two sources namely a survey questionnaire and the online journal. Analysis of data is from three perspectives: participants' learning history with respect to their interest in computer, their computer literacy and the IT situations in schools. Results show that students have been learning about computers for quite a long time but their interest in computers and their familiarity with using computer is quite limited. They just know a few which they use frequently. They lack confidence to use and learnt new tools. Data also suggests that if one is to improve this situation, courses about computing have to provide an authentic environment for students to understand any software learnt. Computer curriculums should emphasize the relationship between computes and daily life contexts. Further, students should be given successful experience of using computers. Therefore both the data from questionnaire and online journals contains implications for the researcher when designing and implementing the curriculum.

5.2. Self-assessment: Is there any trace of reflective thinking?

Boud (1994, p.10) defined self assessment as 'the involvement of students in identifying standards or criteria to apply to their work, making judgments about the extent to which they have met these criteria and standards'. The concept of self-assessment in this study refers to the above definition in one perspective. The notion of self-assessment used in this study also involves students in the process of self-reflection from another perspective because the process of reflection requires students to go through the learning process again and evaluate the experience (Boud 1994). The question of whether students engage in self-assessment can be answered by analyzing the content of journals from these two perspectives. Boud's model of reflection provides insights into the extent to which students reflect or practice self-assessment. The data collected from the online journals and the learning portfolio of forty-six students were analyzed and reported separately below.

5.2.1 Results obtained from online journals using Boud's self-assessment definition

Student online journals were studied to see if students made judgements about their achievement on each lesson. If they did, what were their criteria of judgment? There was a total of one hundred quotations found in the journals which were coded under the theme of self-assessment. Examples of students' self-assessment practice were listed below:

> This lesson is our second assessment test. I am satisfied with my performance because I can do it as instructed and with time left over (CA-S01-L14).
>
> We practice some animation exercises using PowerPoint. Since I find PowerPoint quite easy, I think I know how to do most of the exercises. (CA-S31-L5)

In the first example, the student applies the criteria "time and follow instruction" to

judge her achievement. The second example lists another student who uses the criterion "familiarly with the software" to judge his learning.

Table 5-20. Number of students who engaged in self-assessment in each lesson

Lesson	Topic	No. of Students
1	Introduction	0
2	Word processing	13
3	Spreadsheet	10
4	Presentation Software	7
5	Inspiration (1)	6
6	Inspiration (2)	1
7	Course review	1
8	Midterm assessment	22
9	Test review and Inspiration	2
10	Flash 1	4
11	Flash 2	6
12	Flash 3	6
13	Flash 4	9
14	Final assessment	17

With respect to the length of the course, a period of 14 weeks, and a number of forty-six students, the number of self-assessment quotations found is disappointingly small. Further analysis of students' online journals shows that only a small number of students engaged in self-assessment practices. Table 5-20 shows the number of students engaging in self-assessment with respect to the course content. It can be seen that the number of students practising self-assessment is quite low on average as compared to a group of forty-six students. Many do not judge how well they have done in a lesson. Further, evidence of self-assessment was not found in all lessons. It is easy to notice that the number of students judge their performance more in certain lessons like lesson 2, 8, 13 and 14. Students seem to evaluate more when they have tests in lessons, lesson 8 and 14. From the result obtained, we can deduce that some students have developed certain levels of self-assessment skills while many are not. The study confirms Rowntree's (1987) observation that students develop and use self-assessment skills to variable degrees. In the implementation of the study, no specific training about the self-assessment skills are provided to students. Self-assessment capability is considered to be a powerful ability to cope with the rapid changing environment. The results also point to the importance of formally training self-assessment skills so that more students will engage with the process (Sadler 1998).

5.2.1.1 Assessment criteria employed by students to judge achievements

The analysis of students' self-assessment practice reveals an interesting result of their self-assessment criteria. Students apply different criteria to judge their learning and achievement in the course. Among the criteria used, students tend to evaluate their learning or achievement in terms of their facility with software as listed in the following examples:

> I am not satisfied with my work because there are some parts in every section that I can't remember how to do. I can't submit the files on the deadline. I am late by a few seconds. This is a good lesson for me. So I have to practice more next time. (CA-S16-L8)
>
> In this lesson, I haven't done the class exercises well. It is just a mess. This is because I seldom use the Equation Editor to type fractions and formula. I find that I haven't used many functions of Word. (CA-S24-L2)

This first student considers that she has to put more effort into practicing the software so as to become more skilful. The second student discloses a common situation that students seldom try and learn new functions of application software by themselves. They just follow teachers' instructions. Students also evaluate their learning based on whether they can do exercises given by teachers.

> The worksheet of this lesson has many questions in it. I don't understand these questions. But if I have to know the software Inspiration, I have to practice more based on the questions. Luckily, I can finish the worksheet. (CA-S45-L6)
>
> In this lesson, we learnt a lot about Flash for example drag, play and stop functions. Even though I can finish all the required exercises, I am not familiar with the skills involved. (CA-S22-L13)

The above two students judge their learning in terms of the completion of the required exercises. The second student's assessment criterion is a bit higher. Even though she can finish the class exercises, she is still not satisfied with her skills.

Another criterion commonly used by students is whether they can do the exercises independently. These students will seek advice from books or classmates when they

meet any obstacles as shown below:

> I can follow teacher's instruction and do the exercises. However, when I do it again by myself, the effect is very different from what I expected. I have tried this more than ten times. The result is the same. What's the problem with it? ... I decided to search out the answer in book. (CA-S44-L11)
>
> I can only finish half of the exercise by myself. I have to seek help from classmates for the other half. (CA-S07-L3)

Time is another common criterion applied by students in judging their learning. They would associate time with their performance. They are likely to relate satisfactory results in a test if they can do the exercises faster. Students' quotations are listed below for illustration:

> we've got the test today. I did it all in a hurry coz I did it clumsily and in slow motion. At the very beginning, thinking that it won't be a hard task to finish it, then what I can do was just do all in a rush. Especially the PowerPoint one, using too much time searching for the cartoons. Actually things like Word, Excel and PowerPoint will not be too difficult if we practice more. Overall, it's utterly slow and could do it better (CA-S40-L8)
>
> I know how to do most of the questions in the test today but I can't finish them promptly. I have made some mistakes because of carelessness. (CA-S07-L8)
>
> The test is not as difficult as expected so I can finish the questions early. But I am not satisfied with my performance because there are parts which I can do better. For example, I can't remember how to modify a chart in Excel. (CA-S27-L8)

This section lists those standards which are commonly used by students in evaluating their learning. These criteria include the skilfulness of using an application, completion of class exercises, the ability to perform tasks on their own and the time required to finish exercises. Among these criteria, the standard that students set themselves varies. The completion of class exercises is an example of lower level of assessment criteria while that of the ability to do it on their own is higher. The study echoes that of Taras (2003) that a student often includes time and effort as part of their assessment criteria. This might be due to the belief or norm that the faster the time to do a job, the better is their ability or confidence.

5.2.2 Results obtained from online journal using Boud's model of reflection

Boud's model of reflection in learning was also used to code students' journal. That is, the same set of data was being coded using two concepts. The purpose of applying another coding scheme is to validate the results obtained from previous section. It also enables us to know the level of students' reflective practice.

According to Boud's model, there are three sub-processes in the reflective process:

1. Returning to experience is the recollection of events that has taken place and the replaying of the experience in the mind of the learners or the recounting to others the experience.
2. Attending to feelings - utilizing positive feelings to provide the basis for new learning and removing obstructing feelings to settle them are the two issues addressed in this phase.
3. Re-evaluating experience includes association, integration, validation and appropriation. These are processes of reflection as well as outcomes of reflection.

Analysis of the journal data are based on these sub-processes. It is only in the third sub-process that students experience deeper level of learning outcomes of reflection like integration, validation and appropriation. Examples of these codes have already been listed in the methodology chapter. In this section, the results of each group of students are presented.

5.2.2.1 Year one students of computer applications course

The content analysis of year 1 students' journals based on Boud's model of reflection found that there were 260 reflective entries. Over a span of 14 weeks, students were engaged in different processes of reflection. However, this cohort of students appeared to spend most time expressing their feeling on the lesson (39%) and the act of simply recollecting the lesson experience (25%). The association of the lesson experience with their previous experience, knowledge or attitude (27%) was also a

major process that they presented in the journal. Even though these students could be considered to be in the reflective cycle of learning process, they seemed to be at the early stage of reflection because the frequency of deeper learning processes like integration (7%), validation and appropriation (2%) was quite low.

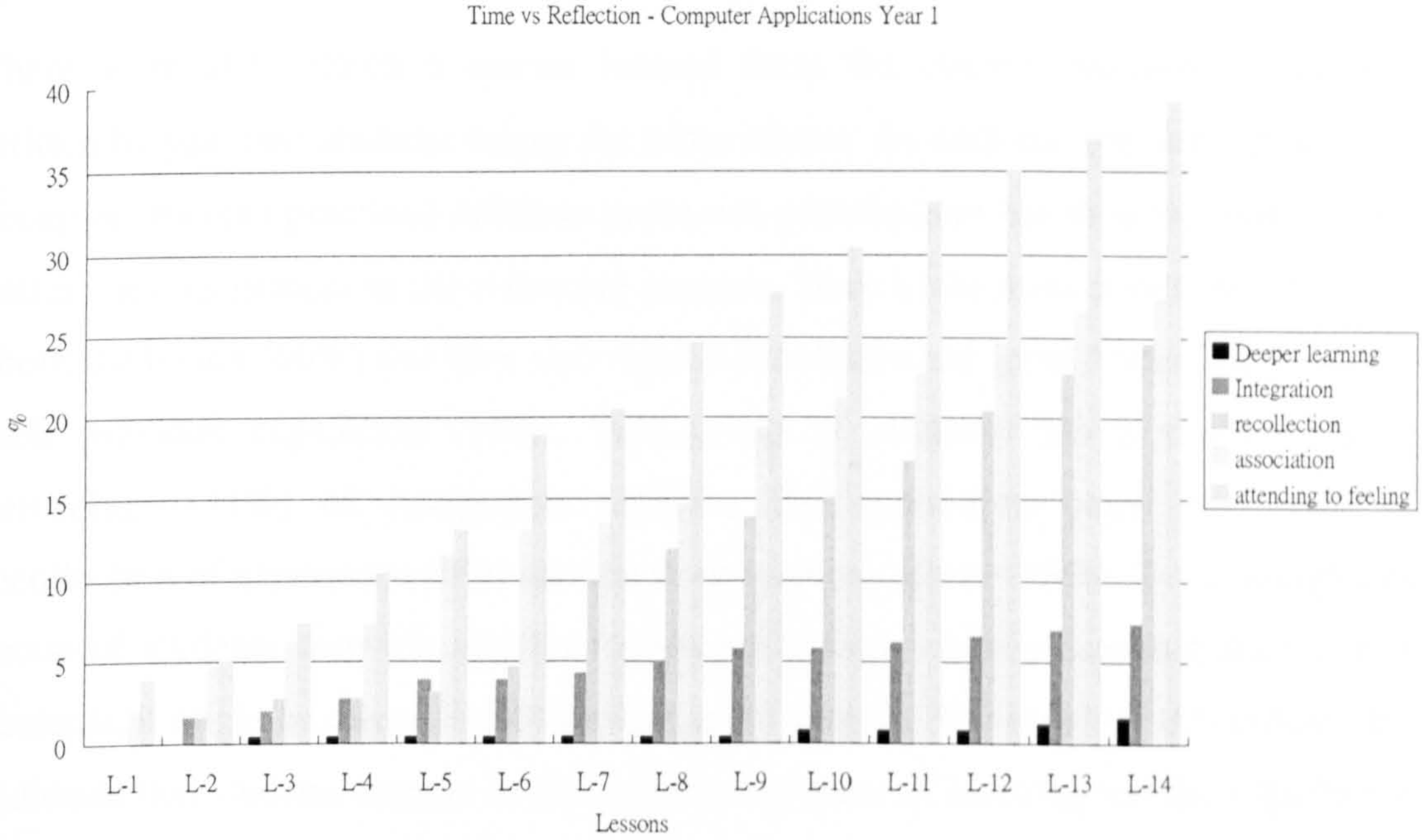

Figure 5-1. Cumulative frequency of reflective practice of year 1 students over a period of 14 lessons

The cumulative frequency of the reflective practice of year one students taking computer applications course is shown in Figure 5-1. The number of reflective entries for different stages of reflection including *attending to feeling*, *association* and *recollection* remains quite steady over 14 lessons. Jumps appeared at lesson 6 - Inspiration and lesson 8 - Mid-term test for *attending to feeling* entries. Students appear to write more about their feeling when they learn new software or when they have tests. An increase of entries associated with *recollection* stage was found at lesson 7 (course review). Jump of *association* entries was found at lesson 2 - Word, lesson 5 - PowerPoint and lesson 9 - Flash. Since students learnt these topics before, they tended to associate their learning experience with the previous experience.

5.2.2.2 Year two students of computer applications course

There were 163 reflective entries located from the content analysis of journals written by year two students taking the same course. As with the previous group, this group of students practised different processes of reflection but they showed another pattern of engagement in the reflective process. They wrote most about their feelings about the lesson (60%) and they also related the experience gained from the lesson to their previous experience (19%). This group of students has a slightly higher percentage (11%) of integration process. The remaining parts were that of recollection of experience (5%) and the deep learning portion (5%). Even though this group of students shows a slightly higher percentage of deep learning than year 1 students, it might be due to the difference in the sample. The result of this cohort also indicates that students engage in the reflective process of learning but their quality of reflection is superficial.

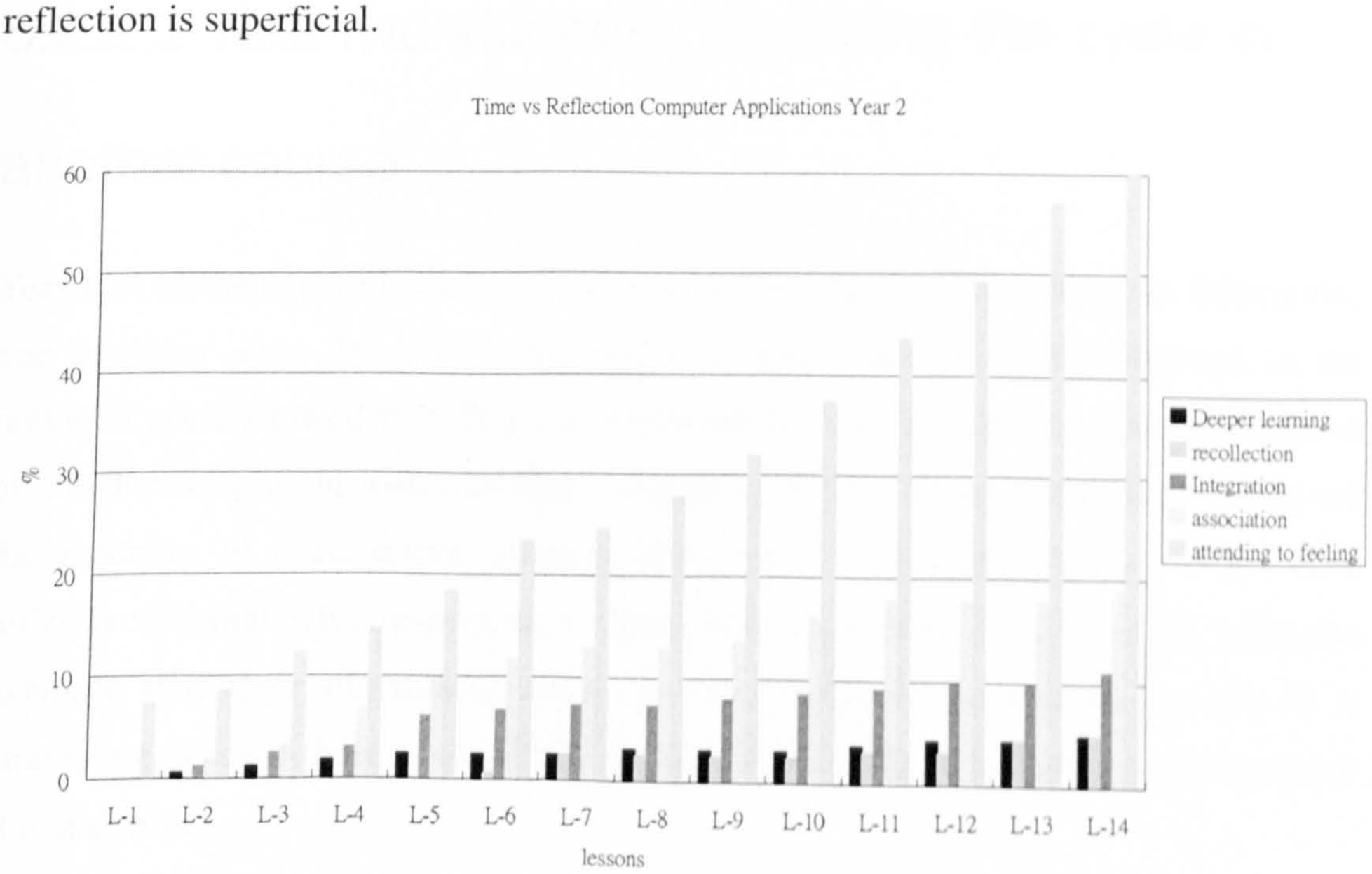

Figure 5-2. Cumulative frequency of reflective practice of year 2 students over a period of 14 lessons

The cumulative frequency of the reflective practice of year 2 students is shown in the Figure 5-2. Despite the difference in the year of study, students taking the same course seem to have similar patterns of reflection. The number of reflective entries

for different stages of reflection is quite steady over 14 lessons. Students wrote more at certain lessons like lesson 2 – Word, lesson 4 – PowerPoint, and lesson 5 - Inspiration. This might be due to new experience when they were introduced a new topic. As they had learnt such topics before, they would associate the experience with the previous one. Another similarity of these students is that they are at the early stages of reflection. This might be due to various reasons like the unfamiliarity of writing reflective journals, the nature of the course and students' past experience of learning about computers. Students were not taught how to write reflective journals. They might just write their feeling or recall the experience. The computer application course is more technically oriented than other courses. Students' attention was on the feeling of learning technical skills and on ways to relate their feelings to their high school experience. If these students experience another cycle of the study, would there be the same result with the intervention of introducing reflective journal and non-reflective journal?

5.2.2.3 Year two students: repeating the cycle in another course

Year two students enrolled in another course, Information Technology in Education, one semester after. They were requested to write journals again. Students in the previous cycle showed that they had problems in writing journals. The explanation of a reflective journal with concrete examples was used to help students understand the meaning of a reflective journal. They were shown the characteristics of a reflective journal with respect to a non-reflective journal based on the authentic example that their classmates wrote in the computer application course. It is interesting to see if there is any difference in results if the same group were analyzed at a later time.

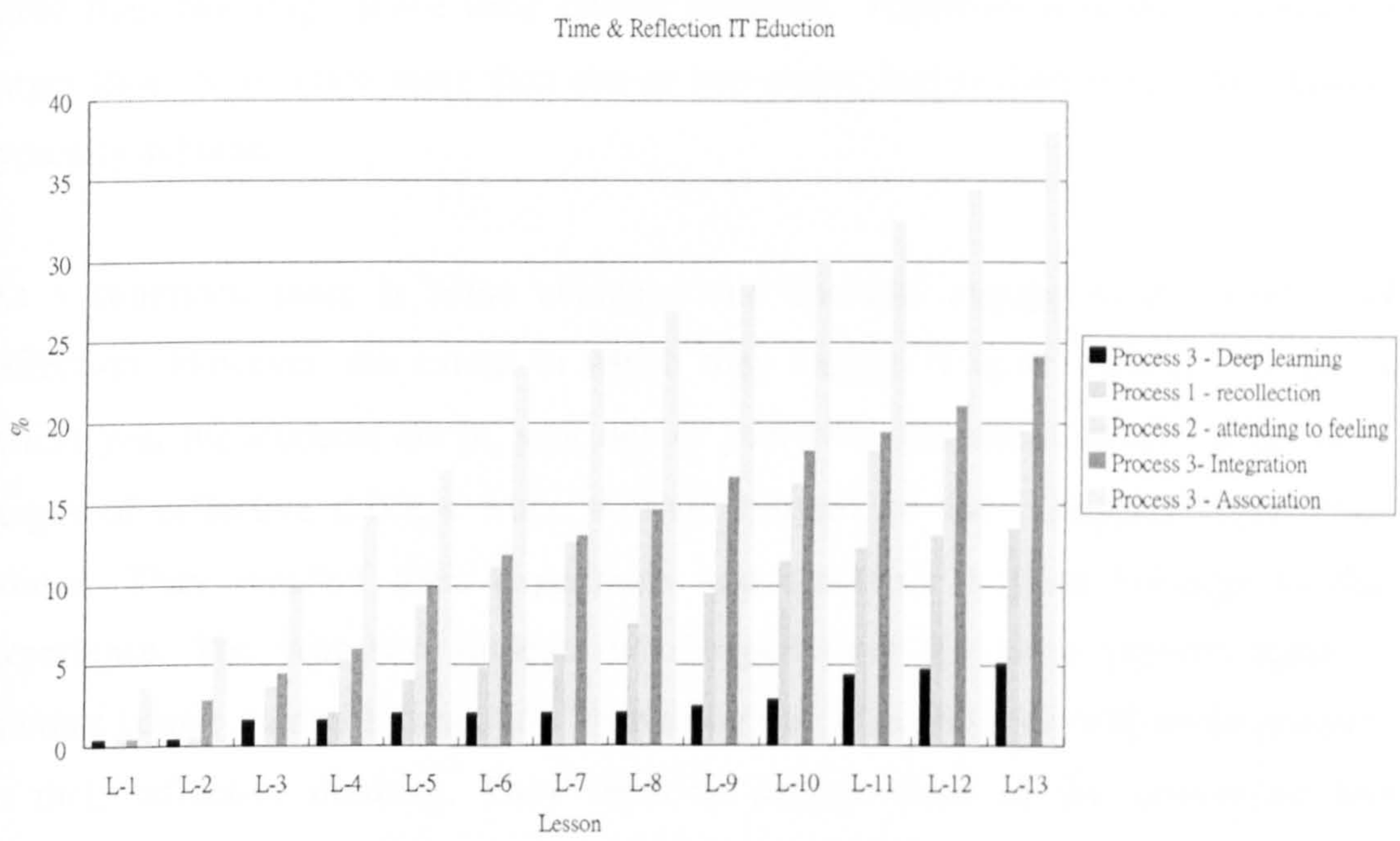

Figure 5-3. Cumulative frequency of reflective practice of year 2 students in another course over a period of 13 lessons

A total of 253 reflective entries were found in students' journals over a period of 13 weeks. Figure 5-3 shows the cumulative frequency of the reflective pattern of year two students taking another course. The reflective pattern of these students shows a slightly higher order of thinking. This group engages more in the association process (38%) and integration process (24%). The lower level of reflection processes like attending to feeling process and that of recollection of experience are 19% and 13% respectively. Comparison of the data shown in Figure 5-2 and Figure 5-3 suggests that the intervention of introducing reflective journal to students facilitates students' reflection. This is because there was a sharp decrease in the recollection of experience from 60% to less than 20%. The percentage of students practicing association and integrations increases from 19% to 38% and 11% to 24% respectively. They would relate the experience gained from class to their previous experience. They also seek relationships through the association process and new insights obtained. Although there is some improvement in these processes, comments that suggest deep learning process is not high as expected. There are just 5% of remarks, which is the same as previous two sets of data. This result suggests that the development of deep learning process of thinking is not likely to be observed within such as short period. That matches what Kitchener and King (1990) found in their study of reflective judgment model. They found that learners could hardly reason

more than one stage above their typical response. Therefore educators should not target their intervention more than one or two stages higher than where the students typically achieve.

As a summary, there is some evidence that students engage in the process of reflection. However, the extent to which they engage is quite limited. No matter which year the students are in, year one or year two, they were mostly in the early stages of reflective process when writing journals of the Computer Application course. They recalled their experience and attended to their feelings to that experience. The year two students who experienced the same process again in another course named Information Technology in Education showed some progress in their reflective thinking. They seem to engage more in the association and integration processes. There are several explanations for the increase in the deeper process of reflection of this group. One is the experience that students gained in the previous course. The second is that the nature of the course is easier for them to relate to and to arrive at new insights. The third one might be the direct result of the decision to introduce students to the meaning of writing journals and a clear explanation of what constitutes a reflective journal in the first lesson of the course.

5.2.3 Results obtained from learning portfolios

Another source of identifying whether students engage in reflective learning processes is through the construction of learning portfolios. The portfolio is structured to include objectives of compiling portfolios, weekly journals, artifacts of class practices or home practices, reflective questions and a *Second Thought* section. It is designed so that the *Second Thought* section, the objective of the learning portfolio and the reflective questions in portfolio are indicators of students' participation in the reflective process. In order to have an overview of students' engagement in reflection, their portfolio were scanned to check if there is any *Second Thought* section in their portfolio and if they include any objective which is different from ones the tutor provided. Objectives written by students were checked with the content of the portfolio to see if they match. These numbers were recorded and calculated in percentage with respect to a total of the whole sample, 121 students. Descriptive statistics for this information is listed in table 5-21 below.

Table 5-21. Percentage of students who have *Second Thought* entries and include personalized objectives in portfolio

	Yes	%*	No	%*
No. of students have *Second Thought* entries in learning portfolio	48	(39.7)	59	(48.8)
No. of students include personalized objectives in learning portfolio	63	(52.1)	51	(42.1)

*Numbers cannot add up to 100 because some students discontinued their studies

All students answered the reflective questions provided by the tutor. Since students answered the questions, they seem to engage in the reflective process. However, some literature on portfolio practice shows that only students with intrinsic motivation enjoyed and demonstrated growth in the process of portfolio work (Darling 2001; Niikko 2002). Therefore interpreting the above data should be done with caution. Data in Table 5-21 shows that not all students wrote the *Second Thought* section in their portfolio. It indicates that only 40% of students read over and thought carefully about the content of their work. They included their second thought about the previous work in the portfolio. With reference to the objectives provided in the portfolio, the percentage of students who included objectives using their own words is 52%. These two numbers show that about half of the sample engaged in appropriate reflection in the process of compiling portfolio. Writing their own objectives prove that students understood the principles underlying the use of meaning of portfolio. As it is mentioned in the literature review chapter, that portfolio has the potential to enhance reflective thinking, these students were likely to be in the reflective stages in the process of constructing portfolio.

Students submitted their learning portfolio in a CD-ROM. It included a PowerPoint file as the door to access other files. Time required to construct a learning portfolio is obtained from file summary of the PowerPoint file. Analysis of the average time which students used to compile a learning portfolio is about 500 minutes. There is a standard deviation of 280 minutes. The minimum time needed is about 100 minutes and the maximum time is about 1200 minutes. It implies a great variation among students' approach of constructing portfolio and their computing ability. Even though there are many factors such as technical issues, organization format etc which affect the time needed to produce portfolio, students do have to allocate time to review their work and present their thought in their learning portfolio. They should have

engaged in the model of reflection in the learning process as proposed by Boud (1994). The level of reflection with which students engaged varies a great deal.

5.2.4 Summary

The objective of this section is to explore the extent to which students practiced self-assessment. Self-assessment is interpreted as the ability to use certain criteria to judge performance in one dimension and the engagement of reflection in another dimension. Data from students' journals and portfolios were examined to study whether students engage in self-assessment from the two above perspectives. Results from both online journal and the learning portfolio provide evidence that students do engage in the process of self-assessment, but this is not true for all students. Even though students reflect on their learning, the level of reflection is not high. It seems that more practice and guidance might enhance students' quality of reflection. That is, the longer the students are required to write reflective journals, the better their quality of reflection is likely to be, given appropriate tutor guidance.

5.3. Peer collaboration: communication amongst peers

Peer assessment is usually defined as the process through which students rate their peers (Topping 1998). In the process of peer assessment, providing feedback to peers is essential for students' learning. The concept of peer assessment is applied loosely in the study. It refers to the process of communication among students based on the content of students' blog. Participants in the study are required to read and provide feedback to their classmates based on the journal content. In order to explore if students practice peer assessment, analysis is based on different perspectives such as the number of feedback comments received, the number of feedback comments that students wrote and the content of the communication pattern among students. Descriptive statistics of the number of feedback comments provided to students by their peers begins the section. Then the content of students' interaction with peers is provided. Finally, students' perception on the value of peer feedback elicited by the questions in the learning portfolio verifies the results presented.

5.3.1 Feedback generated during communication

In order to have a picture of students' communication, comments posted in blogs of every student were collected and analyzed. Since students used pseudonyms when they wrote comments on the blog, students were requested to tell the researcher their pseudonyms after the course so that the researcher knows who wrote the feedback. A journal entry written by students may trigger their classmates, tutor or other reader to provide responses. Self-response is also common when the owner of the journal is responding to readers' feedback. This form of communication might generate several messages kept in the blog. These messages form a dialogue among students. An illustration of a journal entry with feedback is listed below:

Journal content:
2006-4-1 Time flies so fast. We need to present our group project next week so we are very busy this week. At first, I don't understand the requirement of group project. After asking Regina, we have a direction for the project. Now we

divide the group project into different parts and assign members to look for the related information. We will compile and synthesize the data later. In this way, I believe we can accomplish the project. I hope I will not be nervous on the date of presentation because I used to be like that. Regina, I hope you won't mind my performance. ☺ (IT2-S06-L7)

Feedback

Student 1 2006-04-02 18:45 Why do you just request Regina for understanding? How about us, your classmates? Don't you think we won't mind? In fact, if you speak louder and slower. You won't be so nervous!
Keep working hard!!!!

Student 2 2006-04-02 23:07 Oh! You just have to think that our classmates are not there. Then you wont' be so nervous! ^^

Student 3 2006-04-08 02:39 I think you put too much pressure on yourself. Relax! Whenever you have test, examinations or presentation, you seem to be too nervous. In fact, if you have prepared for it, practice it once and focus on the content, you will not be so nervous.

The above example has three feedback comments given by peers. When the student wrote the journal on the 1st of April, 2006, her classmates responded to that entry at different times after the posting. It seems that students like to respond at night like student 2 and student 3. As shown in the example, if students were interested in the journal content, a spin off effect of generating messages was produced. Table 5-22 summarizes the frequency of feedback generated in six different classes. It is easy to notice that the average response rate of students to their peers exceeds the course requirement of three responses per students for all classes. This might suggest that students are quite positive about this kind of communication. They engaged in the communication process. Since this number is the overall picture of the six classes of students, it cannot be assumed that all students engaged in the communication process. In order to know whether all students use the blog as a tool for communication among their classmates, the practice of a complete class of students responding to peers is illustrated.

Table 5-22. Number of feedback given to students by their peers

Course	No. of Students	Peer Response	Self-Response	No. of feedback generated	Feedback to Student Ratio
Computer applications – year 1	19	176	40	216	11.37
Computer applications – year 2	27	140	15	155	5.74
Information technology in education – year 4	30	122	8	130	4.33
Information technology in education – year 5	17	69	9	78	4.59
Information technology in education – year 2	19	98	7	105	5.53
Educational Technology – year 1	27	119	30	149	5.52
Total	139	724	109	833	

Communication in terms of the feedback frequency of the Information Technology course year two students is given in Figure 5-4. With reference to the figure, four students on the left of line A did not follow the assessment requirements of writing three sets of feedback to their peers. Four students between line A and line B just met the assessment requirements. The remaining eleven students wrote more than the course requirement. Among these eleven students, seven students on the right of line C were more active in responding their peers' journal. The distribution of students' written feedback suggests that about one third of students engaged in the process of communication while the remaining students were not. They wrote feedback because of the assessment requirement of the course and some even did not care about getting the marks available for simply contributing.

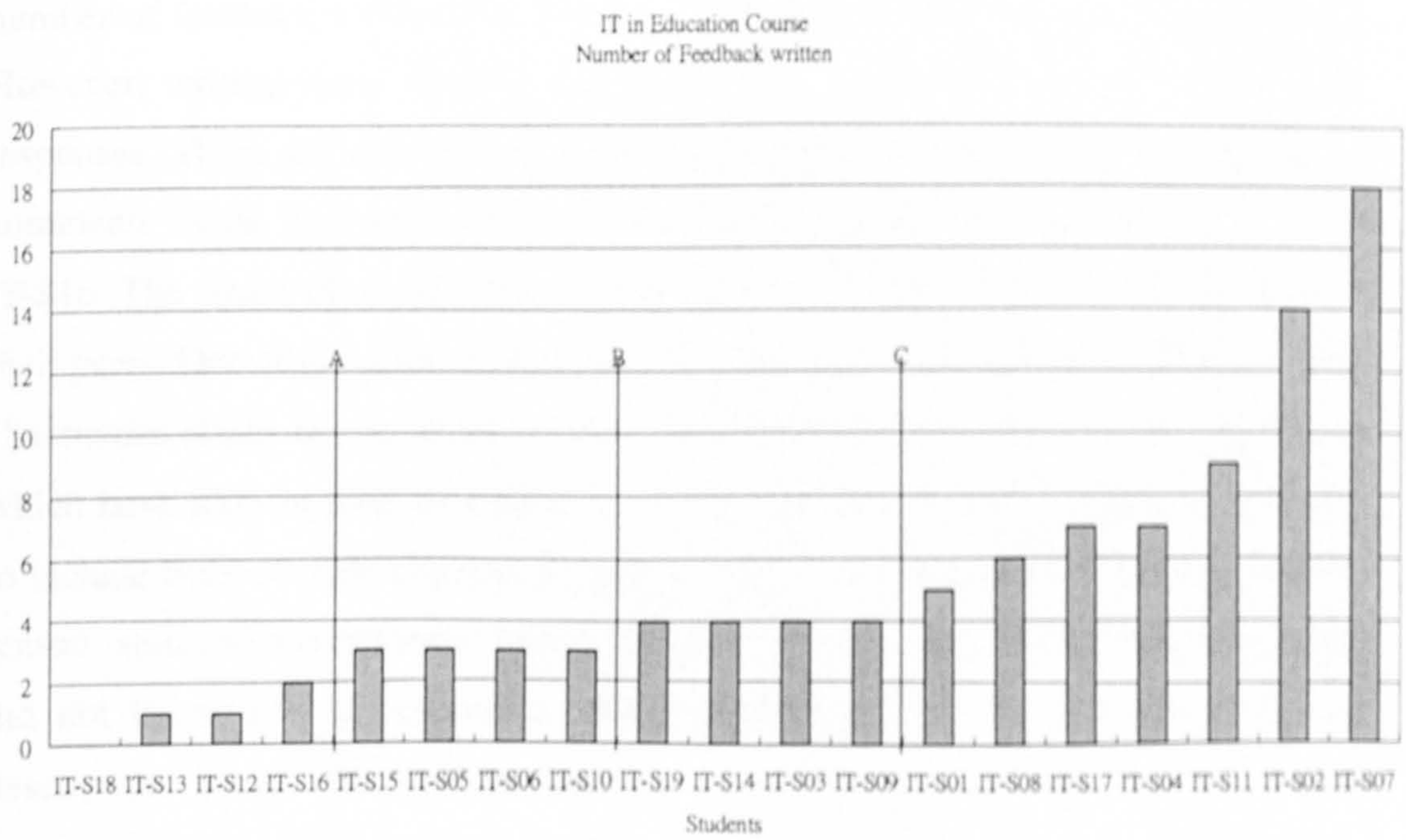

Figure 5-4. Number of feedback responses written by individual students in IT courses to their

classmates

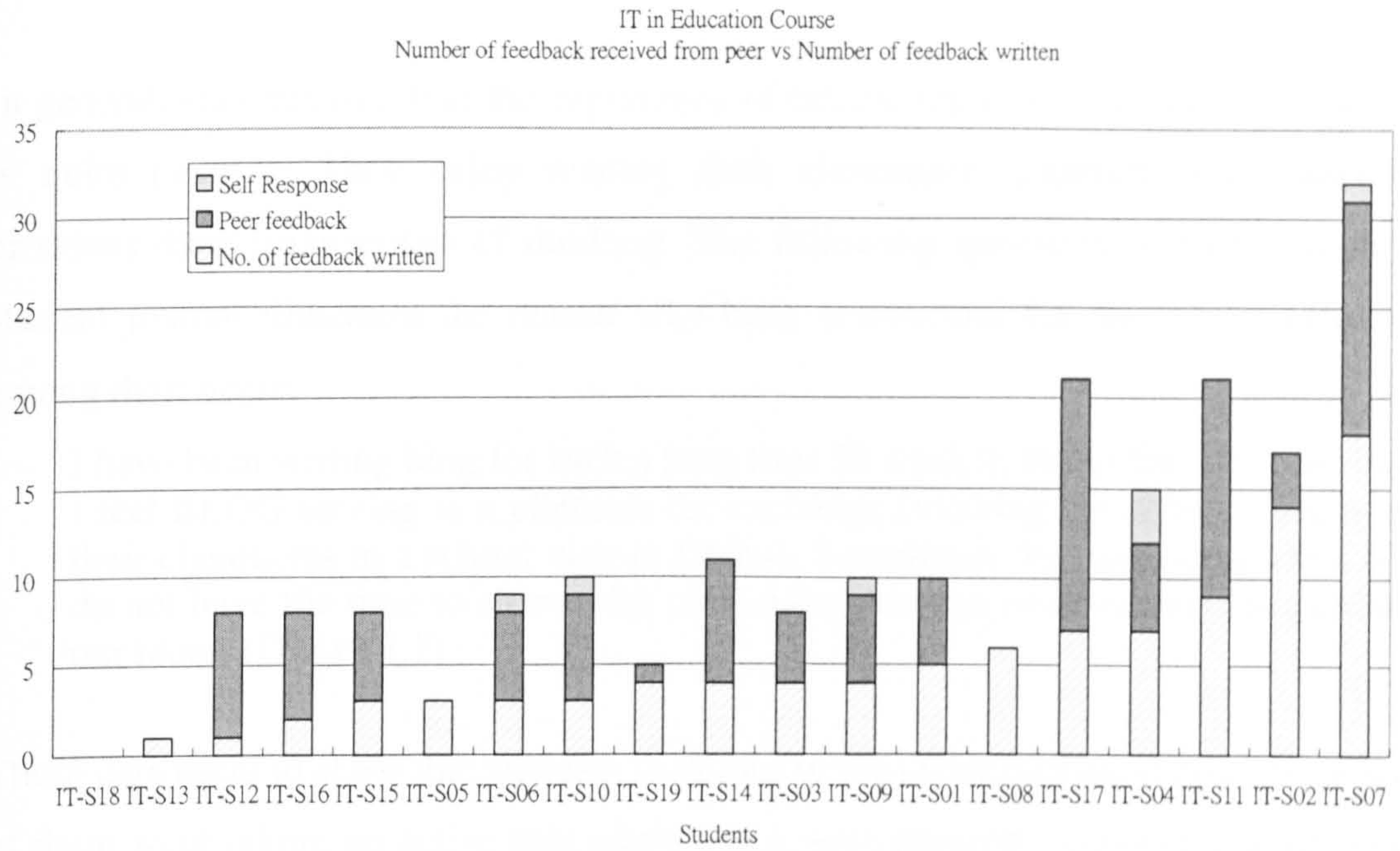

Figure 5-5. Number of feedback responses received with respect to those written by students

Another figure, Figure 5-5, shows the number of feedback comments which students wrote with respect to that of received from their classmates. The number of feedback comments students received is usually more than the number written. A few students like IT-S06, IT-S09, IT-S04 and IT-S07 even responded to the feedback received. These students should be taking part in the dialogue. The figure also implies that the number of feedback written by students is proportional to that of received feedback. However, writing more does not guarantee that the student would receive more responses. There are also special cases where students who wrote a few feedback comments might receive a lot of feedback from others like students IT-S12 and IT-S16. The figure also shows that a few students do not receive any feedback from their peers. One of the reasons to explain this situation is the location of their journal. Classmates might not be aware of their blog addresses. Students tend to visit blogs which have links in their own blog. In future practice, students should be reminded to include links of their classmates' blog in theirs. Content of the journal is another reason which affects students' interest in participating. Some students said that they did not know how to respond to their classmates because the content was too descriptive. Social relationships between the students and their classmates also contribute to the number of feedback comments which students received. Students

who are friendly in class appear to have more feedback.

In general, students find that the experience of interaction in the online environment is quite positive. They enjoy reading their classmates' journals. This practice broadens their perspectives of thinking. The following quotation extracted from a student journal illustrates the reason why blog is essential for the communication among their peers:

> I have been writing blog for such a long time [6 weeks], this is the first time that I feel BLOG serving as a platform for exchange [viewing the different focus of their classmates in a school visit in China]. Sometimes we have some ideas but do not have the time to share with classmates, we can now use blog to publish our ideas. (IT-S19-L7)

These data seem to show that students took part in the communication process. Some of them were taking an active role while some were passively communicating with others. The results of the study are easier to interpret if the content of interaction among students is analyzed as well. Therefore the following section shows an overview of the substance of students' communication with peers in their online journal and feedback.

5.3.2 Content of students' interaction with peers

The recorded information about students' communication is obtained from the track back function of the blog environment. Students exchanged ideas based on the journal content. There are 833 messages from six classes of students. Analysis of the contents of messages with respect to the journal content led to a categorization of students' feedback content into 6 categories. They are: confirmation of writers' feeling or opinion, encouragement, sharing of personal experience with that of the writer, response to questions, discussion of assignment and other opinions. Examples of these categories of students' feedback content are listed in Table 5-23.

Table 5-23. Examples of students' feedback to assigned category

Category	Example
Confirmation of writers' feeling or opinion	I agree with your view. I think we lack technical skills. In the design of the lesson, I think it is hard to think of a context which students are interested. It is not an easy task to do. If the context is designed properly, the steps followed are easy to accomplish. (IT2-S02-L12)

Encouragement	I know we have improved a lot since last year. At that time, we even didn't know how to input Chinese but we know how to use Flash now. We still have a lot of space for improvement so we must work hard. I believe we will succeed if we have confidence. (IT2-S16-L2)
Sharing of personal experience	I think this lesson is too hard for me as I haven't learnt it before. There are lots of buttons to press and I am not sure which one is correct. It is so confusing. Anyway, I believe practice makes better. (CA-S11-L10)
Response to questions	(Question: What do you think of your work?) I think it is acceptable because there is the element of story in it. Besides, I have experience of doing it. I think I must change the setting of the story. (ET-S18-L9)
Opinion	I think both knowledge and skills are important in Webquest. Teacher should balance these two dimensions when she designs a Webquest lesson. Similarly, in our case, we have to look at a Webquest lesson given by the tutor. In the process of looking for information, we have to analyze and synthesize that information. We are gaining both knowledge and skills of implementing Webquest lesson. (IT2-S04-L12)
Discussion of assignment	Are we going to design fraction courseware in the group project? But I really want to design a multiplication table because I have got a sample as reference. Please make decision. I have a CD-ROM which might help. (CA-S10-L7)

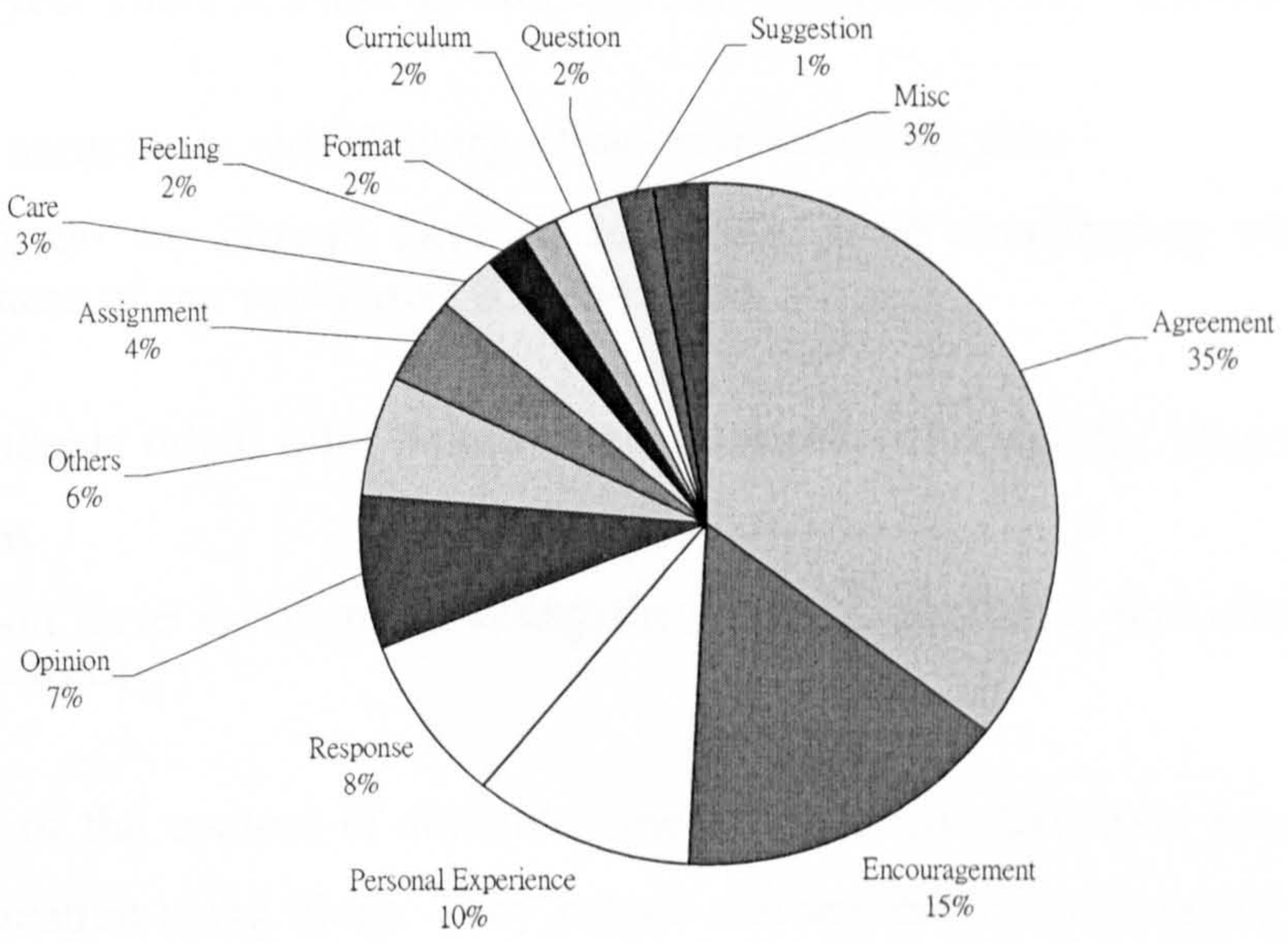

Figure 5-6. Types of feedback comments given by peers

Figure 5-6 shows the various types of feedback comments written by students. Among these themes, confirmation of writer's feeling or opinion occupies 35% of the overall messages. Students would provide their viewpoint in support of the writer's view. Sending encouragement about 15% is the second large category while sharing of personal experience with that of the writer about 10% is the third big group. Students also provide personal opinions about 8% or specific response in about 7% of the responses to their classmates. From this information, it is clear that students' responses to their classmates are mostly positive. They either agree with the

journal writer or send encouragement to the writer. Students communicate with their classmates through the blog environment either in the form of sharing their personal experience, or responding to the journal writer in terms of opinions or feeling. It seems that this channel facilitates students' learning through the affective domain. However, analysis of the communication pattern finds few messages related to students responding a critique to their peers. It might be due to the culture of Chinese students who are not used to providing critique and are afraid of offending their classmates.

Some uncommon themes appear in the communication content of peers as well. For example, students would remind their classmates that a test was approaching as shown below:

> Oh yes! There is a test on Monday. Have you revised it? (CA-S23-L7)

Students sometimes would query situation in class like this:

> Why do we always have to seek help from neighboring classmates? Is it because of our problems? (CA-S43-L5)

Some students might offer help to their classmates through the blog environment. It appears as

> If you have problems in doing the learning portfolio, just come and ask me. (ET-S05-L7)

Analysis of the content of students' interaction shows that they benefited from the communication using blogs. They helped one another by exchanging ideas, offering encouragement and advice.

5.3.3 Students' view on the feedback given by peers

The above interpretation of the results is verified by students who responded to a list of questions in the second cycle of the study. The reflective questions in the learning portfolio of students help to depict the view of students on the feedback given by their tutor and their classmates. These questions were only added at the second cycle of the study. Therefore data can only be reported for students in the second semester of the academic year 2005-2006. Forty three students submitted their portfolio at the

end of the course. A summary of students' view on peers' feedback is given in Table 5-24. Content analysis of students' answers to the question "Is peer feedback helpful to your learning? Why?" found that most of the feedback was positive.

Table 5-24. Perception of students on the feedback given by their peers

Codes	Frequency
Support students in affective domain	17
Exchange ideas	14
Solve students' problem	6
Trigger self-reflection	4
Revise the lesson in class	3
Generate new knowledge	2
Total	46

*Some students' answer has more than one theme.

Most of the students stated that the feedback provided by their classmates was helpful to them. Peer feedback benefited students differently. The major benefit is in the affective arena. Peer feedback helped students to develop their confidence and boosted motivation for learning. It enabled students to receive encouragement and sensed their importance. Examples of students' perceptions are given below:

> A short encouragement by a peer reinforces my motivation to learn. (IT-S09-portfolio)
>
> Whenever I read my blog, I always expect my classmates' responses. In viewing their feedback, I know whether we have the same concerns, problems, opinions or thinking. So I like this approach of peer-learning. (IT-S02-portfolio)
>
> The encouragement of my classmates enhances my confidence and enables me to do better. (IT-S06-portfolio)

Besides supporting students in the affective domain, peer feedback allows students to exchange their ideas with classmates; some of these ideas might solve the doubts or misunderstanding of the student. Feedback also triggers students to reflect on their own learning based on the responses of their classmates. The process of re-collecting the experience enables students to revise the lesson learnt. Most importantly, students construct knowledge through interaction with their peers. The following scripts from students illustrate various functions of peer feedback:

Everyone wants to have their own work appreciated. I do want to share my

feelings and experiences with others. As classmates have different understandings on the same subject, we share and exchange ideas [through blog] (IT-S09-portfolio)

Through online blog environments, classmates provide quite a number of meaningful opinions. These opinions provide a sense of support to us. Besides, it also enables us to understand each other better to share skills of learning. It is very productive in this kind of collaborative culture. In fact, during the learning process, students should not just explore questions individually; they should communicate with one another collaboratively. During this process, one might discover contrasting ideas which in turns deepens and broadens their knowledge gained. Therefore I appreciate every feedback given by my classmates. Their feedback not only serves as my reference but I feel a sense of being appreciated. (IT-S11-portfolio)

Through posting questions or problems on blog, I obtain some ideas which I haven't thought of and it solves my problem.(ET-S24-portfolio)

I remembered the visit to an experimental primary school in China. I considered the definition of a good teacher provided by the principal of the school was too commercial. But the feedback of my classmate provided another window for me to think over. Sometimes, the feedback of classmates might not be a clear answer to my question. A simple question such as "If you are a primary teacher, how will you expect your school to support your implementation of WebQuest?" might stimulate me to have new insights! (IT-S01-portfolio)

I agree that peer feedback is helpful to me because their responses enrich my understanding of certain topics. Besides during the process of sharing experience, we encourage each other. But I have to comment that reading and responding to classmates' journals should be done wholeheartedly otherwise the feedback is of no use. Feedback should not be done for the purposes of assignment requirement. (IT-S10-portfolio)

The final script should be noted particularly because it shows that students also evaluate peer feedback critically. This is evidence that they examine the feedback carefully to see if their classmates' feedback is done for the purposes of assignment or for the sake of their learning.

Although many students have a positive attitude towards peer feedback, five students have a mixed attitude toward peer feedback. In order to identify the reason which leads to students' mixed attitude towards the peer feedback, all their responses will be shown. Their responses to the question of "Is peer feedback helpful to your learning?" are as follows:

For the third student (IT-S16-portfolio), she did not value the affective function of peer feedback. She expected critical comments from classmates but she did not get any from her classmates. This student shows an interesting phenomenon. That is students prefer to have critique from others but they are not prepared to provide critical comments to others. The belief that face-to-face communication was much better than online communication affected the fifth student (ET-08-portfolio) not to take the initiative to provide feedback to others. Therefore these students did not have much feedback. The low response rate is likely to affect students' perception of the value of peer feedback. Several factors affected the response rate of blog. It includes the location of the blog, the practice of students writing journal on time, the mutual knowledge problem, their experience of having feedback and perception of online communication. Despite these opinions, students tend to appreciate the value of feedback provided by their classmates. If peer communication through blog is implemented in future, work has to be done to ensure students receive feedback from their peers. Teachers should devise initiatives like the promotion of students' blog address, guidance on the writing of journal content and the cultivation of a learning environment which promotes discussion.

5.3.4 Summary

This section analyzes students' communication in terms of the frequency and content of online journals. Results are also verified using information collected in the learning journal. The results of the study show that the majority of students took part in the process of communication. However, a closer investigation of the information reveals that not all students participated in the process. Students seem to be quite positive towards this new environment and communication channel. They expressed different categories of messages by reading and sending. Feedback from their classmates enhances their learning motivation. However, due to various reasons, some students did not have the chances of experiencing peer feedback. Since the concept of peer assessment refers to students' communication through online blog environment, some students were engaged in the process of peer assessment while some did not. More work needs to be done in this area so as to ensure that everyone has the chance of receiving feedback. Further, the practices of communicating among students can be extended.

5.4. Feedback provided to students by their tutor

Constructive feedback is essential to students learning. It is considered as one of the most effective intervention which advances students' achievement (Hattie, Biggs et al. 1996). In the previous section, feedback given by peers is analyzed and students' perception of the value of peer feedback is shown. This section begins with the content which students communicate with the tutor to set as the backdrop for tutor provision of feedback. This information also provides a checkpoint for consistency of the feedback content given by the tutor. Then the descriptive statistics of the number of feedback comments given to students by the tutor and the analysis of tutor feedback follow. Finally, students' view on the feedback given by the tutor closes this section.

5.4.1 Content of students' interaction with tutor

Students were welcome to express anything or reflect on their learning in the weekly journal. Journal content revealed rich information on students' learning related to course content. Classifying journal content is based on the unit of meaning which may be phrases, sentences, paragraphs or messages in the journal. The content analysis of 65 students' journals for a period of 13 to 14 weeks shows that students' writing can be grouped into several themes. Table 5-25 illustrates examples and frequency of themes identified from students' journals.

Table 5-25. Examples and frequency of themes that students revealed in the weekly journal.

Topics	Example from students journal	Frequency
Self-assessment	I can finish the worksheets provided in class on time and quite smoothly. (CA-S1-L2)	106
Student background	I am quite interested in homepage editing and image processing so I learnt these skills during summer. (CA-S7-L1)	91
Course feedback	In this lesson, time is quite tight. I can't even understand one task clearly and then there is another for me to work. Therefore I have to take notes. (CA-S12-L2)	76
Assignments	In this lesson, we submit the draft of our group assignment and know that we are on the wrong track. It is good that we still have time to revise it. (CA-S17-L6)	54
Questions	What is the meaning of the function "Count" and "Rank" in Excel?	36

	I am sorry that when you explain these terms, I do not pay attention at that time. Can you explain it again? (CA-S22-L3)	
Practice after school	I tried to work again the tasks given in this lesson. It just takes me half an hour to finish it. As I am not so familiar with the software and I need time to look for the required icon, I am satisfied with my performance. (CA-S10-L2)	30
Irrelevant topic	After class, I attended Chinese course. I felt sleepy and I didn't have a good slept for two nights. It's really funny. We, four boys, are given nicked name "F4" by the girls in class. (CA-S35-L2)	21
Blog	It seems that the network traffic of blog is quite busy; it takes a long time to load so it feels quite inconvenient. (IT-S13-L7)	19
Course Expectation	I don't know what an ideal or successful IT integrated lesson should be. I hope Regina will tell us. Besides, I really want to have another field trip. (IT-S15-L7)	12
Tutor	I feel that Ms. Chan cares for students. She frequently asks if we understand or follow the lesson. (CA-S29-L4)	7
Suggestions to course	If only lecture method is used in a 3-hours lesson, it is quite boring and makes me feel sleepy. If every class is like this class, i.e. half of the time lecturing and half of the time going to computer room or taking part in activities, it will be much better! (IT-S3-L3)	5
Response	In response to the question of the resources needed when implementing webquest, I think one computer is enough. (IT-S19-L12)	1
Total		458

Referring to the above table from top to bottom, there are twelve themes located in the journal content with the self-assessment topic as the most frequent one. This theme has been discussed in the previous section so it will not be repeated here. The next common theme is about students' information. This enables the tutor to know students better and design appropriate instruction for them. In the example given, the student (CA-S7-L1) informed the tutor that she was interested in homepage editing and image processing so she made use of the summer to learn these skills. Students made use of the blog to give their comments or feelings about the course content or assignment (CA-S17-L6) issues to the tutor. The example (CA-S12-L2) listed in the table implied that the lesson was running too fast and students appreciated to have the chance of submitting a draft for tutor's comment. This information was very helpful to the tutor so that she could adjust the momentum of the class.

Students also raised questions through the blog. For instance, the student (CA-S22-L3) asked the meaning of the function "Count" and "Rank" in Excel. They informed the tutor how they reinforced their learning at home. Since there was no restriction on the content of the journal, some students (CA-S35-L2) also wrote about irrelevant topics in the blog. Perhaps it suggests that the blog has become a

natural way of communication in class – mixing normal and informal materials. Another interpretation is that students did not know what to write in a reflective journal. The less common topics which students communicated with the tutor are their perception of using blog, their expectation of the course, their impression on tutor and suggestions to the courses. They also responded to teacher's question in blog like "I think one computer is enough" by IT-S19-L12. The range of topics which students raised with the tutor and their classmates is quite varied. However, the total number of postings is still limited as compared to the size of the class.

The question of whether students use blog as a tool for communication with tutor is answered clearly from the table. From the perspective of the range of students' journal content, it seems to suggest that some students feel comfortable communicating with their tutor in this format. Students used the blog environment to self-evaluate their learning in class. They also informed the tutor about their computing background, their practice after school, the knowledge that they had doubts, their progress on the group assignment and their expectation of the course. They also provided feedback and suggestions on tutor's teaching based on their view. However the number of these postings is still quite low with respect to the size of the class. This implies that not all students were actively communicating with the tutor. In order to construct a favorable environment for learning, reasons which contributed to students passivisity in using this form of communication should be identified. Methods should be devised to encourage their active participation. Nevertheless student journals provided the researcher with useful evidence of students' understanding and their current learning progress. Therefore the purpose of collecting information to improve instruction is achieved through this platform. The information provided by students in each lesson journal was used as a reference for the researcher to review the subsequent lesson in the main study.

5.4.2 Feedback content given by tutor to students

Students' journal content provided ideas for the tutor to review and plan the lessons. It also served as the basis for the tutor to provide relevant feedback. Students communicated a wide range of information with the tutor through the blog environment as shown in previous section. In return, the tutor also responded

actively and appropriately to students either in class or individually on blog. The tutor's feedback content was analyzed, and examples of tutor feedback are listed in Table 5-26.

Table 5-26 Examples of tutor's feedback

Category	Example
Encouragement	You have done very well. If you practice more, you won't have to spend time looking for the tools. (CA-S10-L2)
Acknowledgement	Thanks for your opinion. (CA-S12-L2)
Guidance	You might fix it with the "Set Up Show" dialogue box in PowerPoint. (CA-S05-L6)
Clarification	The purpose of having class exercises is for you to learn. It is not for marking purposes. (CA-S31-L6)
Suggestion	I suggest you to do the following changes: 1. If you have any questions, ask the tutor immediately 2. You might also jot down the problem. Ask the tutor after class. (CA-S24-L9)
Questions	Do you know the procedure of video taking and capture? (ET-S01-L9)
Explanation	You can include any sound format which is supported by Ulead Video (e.g. AIF, AIFC, AIFF, AU, AVI, WAV, QT) (ET-S08-L9)
Empathy	I also notice that you are so serious in video taking. (ET-S09-L09)
Confirmation	This is not by luck! Your work is being directed by your thinking. (ET-S22-L09)

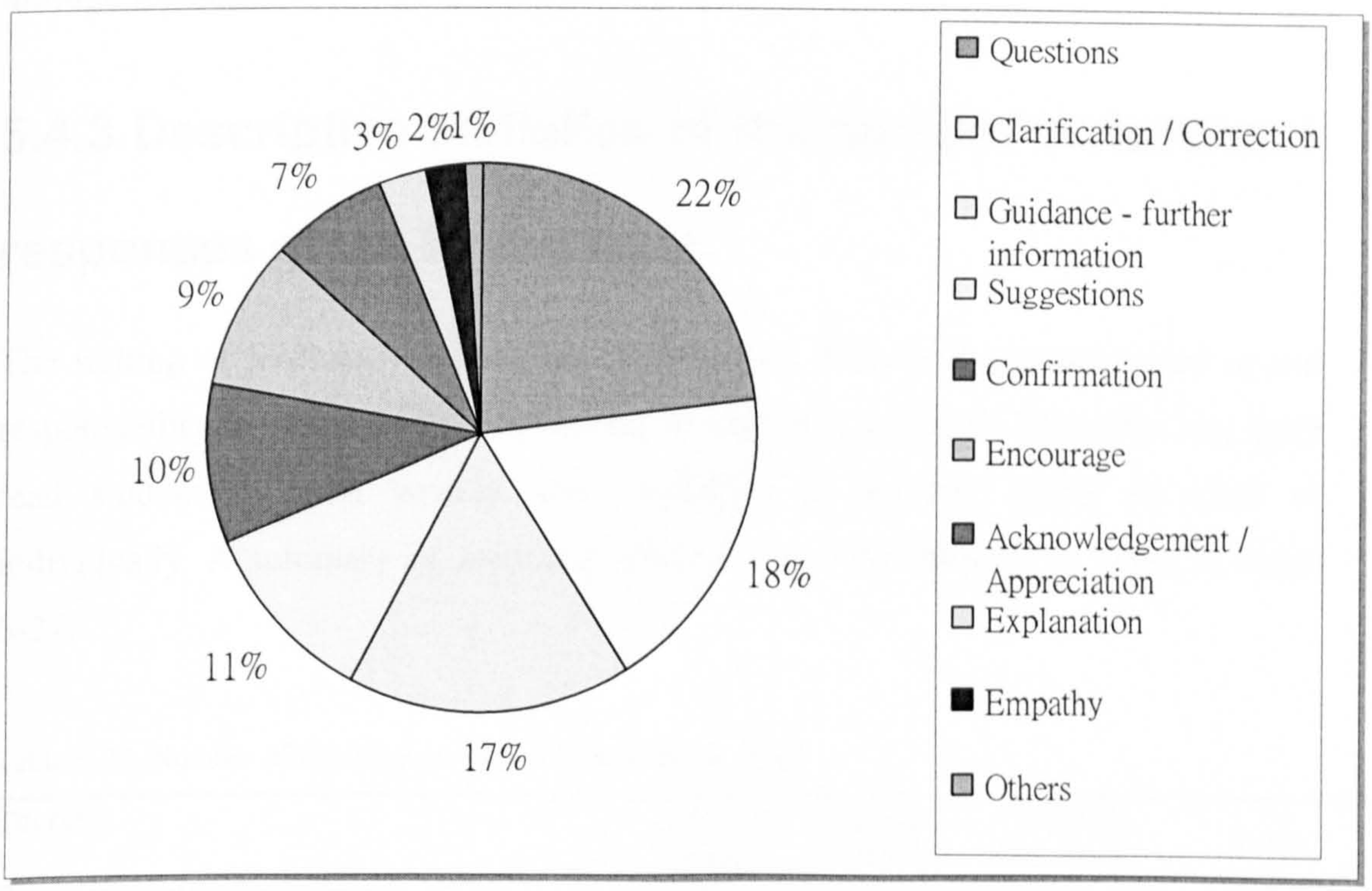

Figure 5-7. Types of feedback provided by tutor

A summary of the content analysis of the tutor feedback collected from the online journal is shown in Figure 5-7. Tutor's feedback was of a wide range from questions, clarification of concepts to empathy. Among the various type of feedback given by

tutor, questioning is the most frequent one. Questioning is one of the techniques of *assessment for learning* (Black, Harrison et al. 2003).It is an effective technique to enhance students' learning. An appropriate question might prompt students to think, so the tutor used it quite a lot especially in the repeated cycle of the study. Clarification of concepts to students through online feedback was another set of messages which the tutor gave to students. Students' review of lessons in online journals allowed the tutor to know if students' were going on the right track or not. If the tutor found that students had some misunderstandings, the tutor could correct them by providing appropriate feedback. The tutor also guided students to share their doubts or questions through online journal. These three groups of feedback, namely questioning, clarification of concepts and providing appropriate guidance to enhance students' knowledge construction occupied 57% of the overall feedback. If students sense that their effort is being valued, their motivation to learn might be increased. Besides supporting students to construct knowledge, the tutor encouraged, confirmed students' ideas, and showed empathy and appreciation to their thinking or work through feedback.

5.4.3 Descriptive statistics of the number of feedback responses given by the tutor

The writing of journals was initiated by the tutor. The tutor was interested or had responsibility in reading and responding to students' journals. Therefore the tutor read students' journal weekly and responded to students either in class or individually. A summary of feedback given by tutor to students is listed in Table 5-27.

Table 5-27. Number of feedback given to students by the tutor

Course	Cycle of study	No. of Students	Feedback from tutor	Ratio
Computer applications – year 1	1	19	16	0.79
Computer applications – year 2	1	27	14	0.52
Information technology in education – year 4	1	30	24	0.8
Information technology in education – year 5	1	17	18	1.06
Information technology in education – year 2	2	19	48	2.53
Educational Technology – year 1	2	27	76	2.81
Total		139	196	

A major objective of the study is to improve instruction. The tutor was always looking for ways to improve the communication with the students. With reference to Table 5-27, the response of tutor was not as frequent at the beginning of the study as compared with her responses on the repeated cycle. On average, less than one feedback comment was given to every student in the first cycle while more than two feedback comments were given to students in the second cycle. This was because the time needed to retrieve the online journal was quite demanding. Time available to provide feedback to students was reduced accordingly. Further, the tutor used time in class to respond to students' feeling, questions or misunderstandings. In the repeated cycle of the research, the tutor assigned a student helper to collect student's blog in an Excel file so that more time was allocated to reading and responding to students individually. In the first cycle of the study, some students reported that the time allocated for providing feedback was too long. They preferred to use the time for instruction. Therefore class time for feedback was reduced in the second cycle. Only issues which related to the whole class were discussed in class. Issues related to individual students were responded to in students' online journals. In the case where issues were restricted to a certain group, the tutor would respond in one student journal and asked the related students to refer to that student's journal. In this way, students were given feedback and encouraged to view others' journals. From the perspective of the tutor, the number of feedback comments provided to students was satisfactory due to the limited time available.

5.4.4 Students' view on the feedback given by their tutor

Feedback content given by the tutor is presented in previous sections. What is the perception of students towards the feedback? Do they consider it helpful or not? Similar to students' view on the feedback given by peers, the result of students' views on the feedback given by the tutor is based on their answers to the reflective questions in the portfolio at the second cycle of the study. Forty three students' answers were analyzed using the content analysis method. Common themes are grouped together. Examples of different themes that emerged from students' responses are listed below for illustration:

If I receive any response from tutor, I am very happy. As I sometimes doubt if anyone really reads my journal, I become aware that my journal has been read. I feel that the distance between tutor and me is closer. Besides, I know if my understanding of the lesson is appropriate or not. (IT-S19-portfolio)

Tutor's feedback and encouragement is very important to the student. The student feels that the tutor cares for them and appreciates them. This might facilitate student learning. A simple sentence of response from teachers' heart is able to touch the student. (IT-S05-portfolio)

The encouragement or the praise of tutor enables me to have incredible motivation to face the learning situation with confidence and energy. (ET-S03-portfolio)

[I] sometimes cannot think of any questions to ask in class, or points about which I still have doubts, [I] can ask question through blog and wait for tutor's response. So it really helps [my] learning. (IT-S03-portfolio)

Tutor's feedback reminds me of the points that I haven't thought of. It helps to better my ideas. (IT-S04-portfolio)

Student (IT-S19-portfolio) considers the feedback as a sign of tutor caring for their learning and a close relationship between tutor and student. The second quotation from student (IT-S05-portfolio) shows that the tutor's response motivates them to learn. The feedback given by the tutor is an embodiment of relationships between tutor and students. They (IT-S05-portfolio and ET-S03-portfolio) sense support and have more energy to continue studying. Tutor's feedback is also a sign of support or encouragement to students. The last two quotations (IT-S03-portfolio and IT-S04-portfolio) illustrate the value of tutor's feedback on confirmation of their thinking and knowledge construction. This is because it directs them to view the subject from different angles. Students also consider the feedback provided by tutor is a form of communication. The feedback provided to students from their tutor is considered to be helpful to students' learning in different aspects namely affective, intellectual domains and communication process.

Table 5-28 shows the perceptions of students on the feedback given by the tutor. It can be seen that communication between tutor and students is facilitated when the tutor responds to students. Students consider that the feedback content of the tutor support their learning in both affective and cognitive aspects. In general, students'

perception on the feedback given by the tutor is very positive. An important result is that no negative views on the feedback provided are located. A few students requested the tutor to provide more feedback to them individually. This implies that students value feedback given by the tutor. Analysis of students' opinions on tutor's feedback finds that they value this form of communication. The tutor's response supports their learning in the affective domain and clarifies their doubts. Students' view matches with the tutor's feedback content in previous section.

Table 5-28. Perception of students on the feedback given by the tutor

Themes	Frequency
Facilitate communication	12
Support students in affective domain	9
Identify or solve students' problem	7
Expect more feedback in blog environment	6
New knowledge	5
Challenging question	3
Trigger student to think	3
Serve as a confirmation of their thought	2
Answer students individually	1
Serve as a model answer	1
Total	49

5.4.5 Summary

This section has presented the content and the frequency of tutor feedback with respect to that of students' journal. Students' perception on tutor feedback is also described. The overall view of students on tutor's feedback is very encouraging. Some students expected more feedback in the blog environment because the feedback is not as comprehensive as feedback given in class. Students revealed that feedback in terms of words was less effective than that of demonstration or teacher's explanation in class. Besides providing feedback on students' online journal, the tutor also responds to students in the class if the whole class shows confusion over a particular issue. This indicates that students value the feedback of tutor independent of the mode of communication. They prefer to have specific feedback to guide them. This finding confirms the study of Higgins and colleagues (2001). They discovered that students were dissatisfied with advice lacking specifications for improvement.

As a summary, feedback from different sources like tutor or peer is very important to students' learning no matter if it is given in terms of cognitive, affective or conative aspects. All students are positive to the feedback given by the tutor.

5.5. Students' perception on writing journals through blogs

One of the features of the study is to employ technology to implement the concept of *assessment for learning*. Is the online journal helpful to students in reviewing their lessons? Is it an effective communication channel among peers or between tutor and students? This section answers these questions based on an interim questionnaire obtained from students. The results shown here are mainly from the questionnaire given to students after a period of writing online journals for six weeks. A total of 135 students responded to the questionnaire which consisted of 8 statements and 5 questions about their perceptions of familiarity with computers and their practice of using online journals. These students included both pre-service teacher candidates (65 %) and in-service teachers (35 %).

Table 5-29. Comparison of students' attitude towards user friendliness of a blog environment and their familiarity of using computer

	Familiarity of Using computer Mean=3.12 Std. Dv.=0.561	%	User Friendliness of blog Mean=3.86 Std. Dv.=0.687	%
Very Difficult/ Very unfamiliar	1	0.7	0	0
Difficult / Unfamiliar	10	7.4	4	3.0
Neutral	97	71.9	30	22.2
Easy / Familiar	26	19.3	80	59.3
Very easy/ Very familiar	1	0.7	19	14.1
	135	100	133	98.6

Table 5-29 shows the data comparing students' attitude towards user friendliness of a blog environment and their familiarity with using computers. Most students (80%) reported that they were not so familiar with the use of computer and many students (79%) had little experience of using blogs. Results from this questionnaire confirm the one shown in section 5.1.1. Even though students were new to the blog

environment, the majority (73%) of them found it easy to write and post entries using the blog environment. This result confirms the results of the pilot study (Chan and Ridgway 2005). Therefore it can be concluded that the blog does not generate a problem for students in terms of the technical skills required in the study. Since most of the students know how to surf web pages in the Internet, they are aware of the basic operations required for the online journal.

Table 5-30. Students' attitude towards expressing opinions about the course and their personal thinking using blogs

	Weekly Journal Mean=3.4 Std. Dv.=0.775	%	Personal Ideas Mean=3.34 Std. Dv.=0.812	%
highly dislike	1	0.7	1	0.7
dislike	13	9.6	19	14.1
indifferent	60	44.4	55	40.7
like	53	39.3	53	39.3
highly like	8	5.9	7	5.2
Total	135	100.0	135	100.0

Due to the user friendliness and the interactive nature of the blog environment, students tend to like using it. The data in Table 5-30 shows that nearly half of the students (both pre-service and in-service teachers) enjoyed the practice of writing lesson journals (45.2%) and personal thinking (44.4%) through this new environment. Since most of the students in this sample are fresh high school graduates or teachers with only a few years of teaching, they are likely to accept new ideas and culture. However, the evidence that quite a number of students (10.3% for writing lesson journals and 14.8% for personal thinking) selected the options of "highly dislike" or "dislike" points out the concern of students. One reason to explain these data may be that content of the blog is available for public inspection; students in the Chinese culture are not accustomed to expressing their opinions in classroom environments let alone in such pubic environments. The in-service teacher group shows a smaller percentage of preferences in expressing weekly journal and personal ideas through the new technology as compared with the pre-service teacher group. It is understandable that in-service teachers are more mature adults who are more critical and tend to accept new technology more slowly.

Table 5-31. Frequency of accessing journals and responding to blog entries

	Read Self Mean =3.18 Std Dv.= 0.7	%	Read Peer Mean=2.73 Std Dv. =0.868	%	Respond to Peer Mean=1.84 Std Dv.=0.937	%
never	5	3.7	14	10.4	53	39.3
once every 2-3 weeks	7	5.2	31	23.0	37	27.4
weekly	83	61.5	69	51.1	22	16.3
2-3 times per week	40	29.6	21	15.6	5	3.7
Total	135	100	135	100.1	117	86.7

Table 5-31 shows the frequencies with which students read their own entries, and read and responded to the blogs of their peers. The mean of students reading self, peer and responding to peer is 3.18, 2.73 and 1.84 respectively. The standard deviation of the three numbers is 0.7, 0.868 and 0.939 respectively. These numbers indicates that students read the journal written by themselves more as compared to that of their peers. They responded even less to their classmates. The significant difference in the frequency of students' accessing their own journal and that of peers might be a direct result of the assessment strategy, but the majority of students made more use of blogs than required by the assessment regime. Over 90% of students read their own journal weekly and nearly 30% of students read their own blogs more often. This might suggest that students value their own effort and content. Nearly 70% of students read their peers' journal weekly. They might be interested in knowing their classmates' opinion and looking for points to give feedback. There are 23% of students who read others' blogs once every 2-3 weeks. The reading frequency of these students might imply that they did it in order to satisfy the course requirements. There are about 10% of students who never read others. They did not take the course requirements into consideration.

One third of the sample seems to enjoy the blog environment because they always read their peers' journals and are actively responding to their classmates. But the remaining students, almost 70%, seldom responded or just responded according to the course requirement. The result between in-service teachers and teacher candidates in these aspects is more or less the same. This suggests that current activities involving blogs are rather superficial, and make little use of the potential for discussion and the co-development of ideas. This may reflect students' unfamiliarity with the new medium, or perhaps deeper cultural issues. It may be the case that students do not consider interactions with peers to be part of the educational

culture. Chinese students have been taught to never question and challenge other's judgment. If classmates perform poorly or fail to meet the expectation of others, it is a sign of losing face or shame. So students are quite passive in participatory activities in order to maintain face. (Chan 1999)

Table 5-32. Students' expectation of receiving feedback from tutor and their peer

	Peer Mean=3.6 Std. Dv.=0.757	%	Tutor Mean=3.93 Std. Dv. 0.693	%
Not expected	9	6.7	2	1.5
Neutral	49	36.3	31	23.0
Expected	63	46.7	76	56.3
Highly expected	13	9.6	26	19.3
	134	99.3	135	100.1

Table 5-32 shows student expectations of receiving feedback from their tutor and from their peers. There was a strong expectation of receiving feedback from the tutor (75%), and a somewhat weaker expectation of receiving feedback from their peers (56%). The expectation of receiving feedback from the tutor was similar between in-service teachers and pre-service teachers. The respect for the teacher in Confucian culture might be the reason to explain why the expectation was so high. However, there was some difference in the expectation of having feedback from peers between in-service teachers (44.7%) and pre-service teachers (62.5%). Pre-service teachers tend to have higher expectations of feedback from their classmates. Students might experience the merits of collaborative culture through the discussion with peers. These include the encouragement, confirmation of ideas and exchange of ideas. The reasons for high expectation of receiving feedback from both tutor and their classmates are listed in section 5.3 and section 5.4 of this chapter. The number in the table also points out a problem. Quite a large number of students (43%) did not expect to have feedback from peers. One reason might be that many students had not responded to their peers yet because this questionnaire was collected at mid-term. Another explanation might be students do not consider the feedback of their classmates beneficial.

Table 5-33. Students' views on various propositions

	Communication tool with tutor Mean=3.81 Std. Dv.=0.637 %	Communication tool with peers Mean=3.54 Std. Dv.=0.835 %	Facilitate students to reflect Mean=3.72 Std.Dv.=0.641 %	Responding to peer is meaningful Mean=3.8 Std. Dv.=0.731 %

Disagree	2	1.5	16	11.9	3	2.2	-	-
Neutral	36	26.7	44	32.6	43	31.9	45	33.3
Agree	82	60.7	61	45.2	67	49.6	60	44.4
Highly agree	15	11.1	14	10.4	22	16.3	12	8.9
Total	135	100	135	100.1	135	100	117*	86.6

*some students do not answer this statement.

Table 5-33 shows students' views on various propositions including blogs as a tool for communication with tutor and among students, the process of writing feedback to classmates is meaningful and writing weekly journals helps them to reflect on the course content and key concepts. The majority (71.8%) of students agree that blogs provide a useful platform for them to communicate with their tutor. Since the tutor responded to students' questions and shared peers' reflections with them, it is perhaps unsurprising that a high proportion of students agreed that blogs serve as a communication tool between them and the tutor. Feedback given by the tutor facilitates students' knowledge construction and increases their motivation to learn for the majority of students.

The percentage of students who agree that blogs provide a useful tool for communication with their peers is 55.6%. The number is slightly lower as compared to that of communication with tutor. It can be explained by the fact that still quite a number of students are not used to the open environment where they can express themselves and share with others. Besides, most Chinese students are brought up in an atmosphere of competitive learning rather than collaborative learning. Despite this, more than half of the students agree that writing feedback to their classmates is meaningful. The reasons underlying their perception are given in the section above.

Student perceptions of the use of blogs as a tool for communication among students, the frequency of students' accessing their peers' journals and their expectation of receiving feedback from peers is quite encouraging. One might query whether students' high expectation of receiving feedback from peer is a direct result of the course requirement that students provide a certain amount of feedback to other students. Analysis of blog entries shows that it is not the case. Evidence of affirmation and encouragement are apparent in students' feedback. This encouraging evidence might suggest that students agree to the value of the blog. However, the low rate of students' frequency of reading and responding to their peers' journal

implies that it takes time to change their behaviour.

Another important role for blogs is to provide an environment for students to review their learning in each lesson. Table 5-32 shows the percentage of students who endorsed blogs as a platform to facilitate reflection. The process of writing requires students to review their experience in lesson and to reflect on their learning. More than 60% of students responded that writing weekly journals helped them to review the concepts and content taught in class. This provides positive evidence that writing a journal via a blog can contribute to students' learning.

5.5.1 Problems encountered

Students are requested to write weekly journals and to fulfill the requirement of writing 50 words for each journal entry. A total of 135 students out of 136 students responded to an open-ended question entitled "What are the problems encountered when you write online journals?" Analysis of students' responses was conducted via a content analysis of students' writing. For instance, a student (IT-S13) wrote the following:

'Time, too busy, I sometimes forget to write and need others to remind me'

This student considered that writing a journal was time consuming and she was too busy to write. This type of problem was identified as problem related to *practice*. Another student (CA-S16) responded as 'don't know what to write in the journal'. The response of this student was classified as *content problem*. Some students did not respond to the question and their answer was coded as *no response*. Some students wrote the words "no problem" and their responses were codes as *no problem*. A total of thirty-two codes emerged and they are grouped into different themes as shown in Table 5-34.

Table 5-34. Responses of students to the question "What are the problems encountered when you write online journals?"

Responses	Frequency	%
No response	3	2
Opinion	9	6
No problem	37	25
Problems	100	67
Total	149*	100

* Some students have more than one opinions regarding the problem they encountered
* Percentages were rounded.

Twenty-five percent of the responses clearly stated that they had no problem in using online blog; sixty-seven percent of the responses were about the problems that students encountered when they were using the online journal writing environment. A small number of students (6%) voiced their opinions in the questionnaire. Examples of students' problem and opinions are shown below:

Table 5-35. Type of problems which students encounter when using blogs to reflect and communicate

Type of Problems	Example	Frequency	%
Technical aspects of using journal	I still don't know how to insert pictures in the online journal.	29	29
Practice associated with journal and course	The requirement of writing weekly journal is a problem	11	11
Content to be included in the journal	I don't know how to start writing the journal and I sometimes forget the topic covered in class when I return to home.	60	60
Total		100	100

Table 5-35 shows the type of problems encountered by students with examples. Problems which students encountered *when they wrote online journals* were eventually arranged into three categories: (1) technical problems (e.g., inserting image onto the blog, or classifying their journal, or that internet connection is required to write online journal), (2) practice problems (e.g., forget to write journal on time, have to submit it weekly, too busy to write journal) and (3) problems related to writing journals (e.g. are unsure of the content to be included in journal, they find that they don't have ideas to write in every class, selecting incidence in class for reflection). For example, 29% of the problems were related to the use of an online environment; 11% of the problems were associated with the practice of journal writing and the course requirement. Students claimed that time was required to think and organize their thoughts when writing the journal. They also reported that they were quite busy in their work and sometimes forgot to write it on time. The majority of problems (60%) were related to the content of the journal. Thirty-nine students reported that they did not have special ideas or class activities to reflect or share on journal in every lesson. Therefore the requirement of writing weekly journals should be reviewed. Nine students were not sure what kinds of content should be included in the journal. Students also reported that they were not satisfied with the content that they provided. They found the journals lacked reflective elements or were irrelevant to the course content. A few also reported that it was hard to express their

thinking in words.

Among the three types of problems, the technical problem is the easiest to solve. Students can learn how to solve it by asking classmates or teachers. Teachers might also conduct a workshop to help students. In fact, some students in the study who wanted to enhance their blog were able to include songs in their blog by asking blog users or referencing online frequently asked questions. The second type of problem relates to students' practice. Since most students were not accustomed to writing journals either online or using papers, it takes time for them to build this habit. One approach is that teachers should continue to request students to write journals. Finally, many students had difficulty with the content of the weekly journal because of the course content. This indicates that the tutor had to review the overall arrangement of the course. The requirement to write journals weekly has to be reviewed as well. Further, students should be given guidance on ideas suitable for reflection. Instruction about critical journal writing should be introduced to students with specific examples.

5.5.2 Value of journal writing on blogs

Similar to the above section, a total of 135 students responded to an open-ended question 'What are the uses of the online journal to you?" Content analysis was used to analyze students' responses. Specific examples of students' responses are listed in Table 5-36. Different themes such as *encouragement* and *sharing*, emerged from the data about the students' perception of the value of writing online journal. A total of 157 quotes are located representing students' view on blog. Since the ideas presented by some students have more than one concept, the number of quotes can be expected to be greater than the number of students responded to the question.

Table 5-36. Codes with examples of students' response to the value of online journal

Code	Examples
Encouragement	Students can encourage one another. (CA-Y1-S39)
Sharing	It enables me to share my opinion with others. (IT-Y45-S32)
Communication	It helps me to record the lesson and enables me to communicate with both tutor and classmates. (IT-Y45-S17)

Assignment		It is part of the assignment required for learning portfolio. (IT-Y45-S27)
Little Use		It seems to be of no practical uses for me. (CA-Y1-S31)
Apply Computer		It enables me to keep using the computer. (IT-Y45-S41)
Understand the better	lesson	It enables me to organize things learnt in the lesson and clarifies the knowledge taught. (ET-Y1-S21)
Express feeling		It makes me feel better when I write my feeling in the blog. It seems to be a way of expressing one's emotion.(IT-Y45-S34)
Revision		To review the content of this lesson. (IT-Y45-S30)
Record		The process of writing journals on a blog enables me to see my growth at the end of the course. (CA-Y1-S42)
Review on learning		The process of writing journal on blog provides an opportunity for me to review and improve my learning if necessary. (CA-Y2-S11)

In order to simplify the presentation, these themes are grouped under the perspective of self-learning and collaborative learning. It is shown clearly in Table 5-37 that students acknowledge the value of blog as a self-learning tool (53%). A blog is considered as a tool which facilitates self-learning. From the responses of students, students consider that writing an online journal allows them to record their learning, to review their lesson, to better understand the topic covered and to reflect on their learning. The fact that students see a blog as a collaborative learning tool (38%) is deduced from the themes of encouragement, sharing and communication. Some of the students deem blogging to be of no specific use to them.

Table 5-37. Categorization of codes under the dimension of collaborative learning and self-learning

Type	Codes	Frequency		Frequency	%
Collaborative learning	Encouragement	1			
Collaborative learning	Sharing	6			
Collaborative learning	Express one's opinion	7			
Collaborative learning	Communication	45	Subtotal	59	38
No response	No Response	3	Subtotal	3	2
No uses	Assignment	2			
No uses	Little Use	10	Subtotal	12	8
Self-learning	Apply Computer	1			
Self-learning	Understand the lesson better	5			
Self-learning	Express one's feelings	10			
Self-learning	Revision	13			
Self-learning	Record	23			
Self-learning	Review on learning	30	Subtotal	82	53
		156	Total	156	101

* Percentages were rounded.

5.5.3 Summary

The results of a survey questionnaire probing students' views on the application of blog to support their learning are presented above. The results are based on the descriptive statistics and the content analysis of qualitative data from a sample of 135 students. The findings can be summarized as follows:

- A majority of students (73%) consider blogs to be user friendly and they (45.2%) like the practice of sharing ideas and writing journal in blog environments. However, many (55.5%) are still not prepared to express opinions in public situations. Teachers should provide opportunities for students to discuss issues in the blog.
- A majority of students read their own journal (91.1%) and that of their peers (66.7%). However some (8.9%) did not read their own journal and many (33.4%) did not read others. This suggests that a strategy needs to be implemented to encourage students to read each others' blogs.
- Many students expect both teacher (75.6%) and peers (56.3%) to provide feedback. However, many do not provide feedback to their peers (66.7%). Work has to be done to encourage students to write feedback so as to demonstrate to them that writing feedback can be both beneficial to their own learning and to that of others.
- A majority of students agree that blog serves as a tool for communication with tutor (71.8%) and among peers (55.6%).
- Students agree that writing a journal in a blog helps them reflect on the course content and key concepts. This suggests that blog technology has the potential to be a tool for collaboration and self-learning.
- The main problem which students encountered is about the content of the journal and the requirement for them to write journal weekly.
- Students acknowledge the value of writing an online journal because it provides an environment for them to express their feelings, review their lesson and interact with both tutor and peers.

This study concludes that collaborative learning is not a necessary consequence of the availability of collaborative tools. The provision of appropriate guidance for students in the process of peer-to-peer learning is likely to be important if current tools are to be used effectively. Far more work needs to be done to ensure that blogs

become part of student activities, to exemplify appropriate uses of blogs, and to modify the existing learning culture so that students can see direct benefits from more active participation in the learning process. Conclusions about the value of blogs for this (and similar) student communities must, therefore be drawn with caution. There is evidence of widespread use and positive student views. However, the results from this section and the previous one show that there is little evidence of extended interactions between students, or changes in their approaches to learning.

5.6. Students' attitude towards assessment for learning based classes

This empirical study is about the implementation of the concept of *assessment for learning* in technology courses. It is a new practice introduced to students. Therefore students' attitude towards their classes is very important for the tutor to revise the curriculum if necessary. Data were obtained through questionnaire survey during the mid-term of different courses. The questionnaire also provided information about students' problems and their expectation for the coming classes. A total of 135 responses was collected and analyzed. For each statement in the questionnaire, students' responses were summed. The frequency, mean and standard deviation of responses to the course during the mid-term period is shown in Table 5-38. The number in the table represents the number of students who chose a specific item of a statement. The number in brackets represents the percentage of students who chose a specific item of a statement.

Table 5-38. Frequency, mean and standard deviation of responses to the course during the mid-term period

Statements	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Mean	Std Devia -tion
1. The content in the course satisfies your expectation.	0 (0)	2 (1)	51 (38)	80 (59)	2 (1)	3.6	0.5
2. I am clearly aware of the course requirement.	0 (0)	13 (10)	54 (40)	62 (46)	5 (4)	3.4	0.7
3. I am clearly aware of the	0	3	30	92	10	3.8	0.6

with the assessment schemes and were clear of their course requirements.

With respect to the experienced curriculum based on the concept of *assessment for learning*, statement 8, many (60%) of students were satisfied with the content of the course. Students (54%) were pleased with the teaching approach offered in the previous lessons. Students seem to be quite satisfied with the arrangement as illustrated in the following quotations:

- This lesson is quite useful because we can discuss the topic of our group project and organize my learning portfolio. In this process, I better understood the requirements of the group project and individual assignment. (CA-S29-L7)
- In this lesson, our teacher did not teach any new content. Instead, she organized another meaningful activity, i.e. providing comments with respect to the assessment criteria to every group about the group project. This kind of arrangement is very good. (CA-S08-L7)

More than half of the students (54%) agreed that topics in the course were useful to them and they could apply knowledge gained in class to their teaching and learning environments. It seems that the current approach of pedagogy is a positive experience for students. These data do indicate that there is room for improvement, for example, in clarifying students' understanding of the requirement of the course, group assignment and test.

5.6.1 Reviewing the curriculum design

The operational concepts of *assessment for learning* implemented in the study include the sharing of assessment requirements and criteria, the provision of constructive feedback, self-assessment and peer assessment opportunities using a blog environment. The sharing of assessment requirements and criteria strategies used in the study seems to be quite successful as shown in previous sections. However, there are still problems encountered such as the passive roles of students in identifying their doubts about the assessment criteria or requirements. They do not make use of chances available to obtain early feedback. It might be due to reasons such as poor time management, or being afraid about the tutor judging them on the

draft (Carless 2006). In order to address this problem, the researcher had to organize a class in the middle of the course especially designed for students to submit part of the group project and individual assignments for comments and raising questions.

Students' perception of the value of feedback provided by both the tutor and their classmates has been discussed above. In order to provide constructive feedback, both the tutor and the students need to read and respond to online journals. However, as indicated in section 5.3 that there are problems of students not receiving feedback and some students not writing feedback. Weaver (2006) explains that students need advice on understanding and using feedback before they can engage with it. The question of increasing the participation rate of students in the online journal is a vital concern for the successful implementation of the *assessment for learning*. The findings on students' content of feedback appear to be more in the affective domain than in the cognitive domain. If knowledge construction through feedback is the main purpose of the *assessment for learning*, students need to be given advice on how to question so as to trigger their classmates to think. Besides, they need to be convinced that questioning is an effective way to learn.

A self-assessment opportunity, another technique of *assessment for learning*, was offered to students through the writing on weekly journals. The results in section 5.2 revealed that students did assess their learning in the weekly journals. However, the criterion and the standard of the assessment vary among students. This implies that guidance should be given to students in order to facilitate their practice of self-assessment. Students in the study did not have the practice of writing journals so students have the problems of writing weekly journals. They do not know what to include in it. This again implies that advice on writing weekly journals should be given to students before its implementation.

In sum, the study can be considered as successful because of the exploratory nature of the implementation of *assessment for learning*. It would have been better if more preparation had been done ahead of the implementation. For example, in terms of self-assessment, advice should be given to students on writing weekly journals, and incentives might be used to encourage students to write journals. Guidance on the provision of constructive feedback should also be done ahead and continuously

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during the learning process. Strategies on encouraging students to communicate among their peer should be devised.

5.7. Conclusion

In this chapter, five sets of information related to the research topic are presented. The first set of results is about students' computing background. The computer literacy of the sample in the study is unexceptional. Their perceptions of computers are mainly based on their previous learning experiences which were done just for the sake of examinations. This information was taken into account in the design of the courses and in the selection of tools which students were required to apply. Results show that students seem to be quite positive with the new environment using technology to reflect and express themselves. Data from different sources provide evidence that some but not all students practice self-assessment and reflection. Even though some students did not engage in self-assessment, they still experienced the early stages of reflection. This experience might enhance their learning slightly. Students' perception towards peer communication through blogs is quite positive even though the behaviors of some students were quite passive. The experience of using a blog to reflect and communicate with both tutor and classmates is affirmative from the results shown. As a note, not all students showing the practice of reflection and collaboration in the current study might be due to the limitation of the research design. Another limitation of the study is the analysis of the group as a whole instead of two separate groups. In a nutshell, the study is conducive to students' learning and teacher's teaching. It still has space for improvements especially with the problems encountered by the students. These will be explored in the next chapter.

Chapter 6. Discussions and Conclusion

The study is about the implementation of the concept of assessment for learning through the technologies of blog and digital portfolio, to enhance students' learning. The aim of this chapter is to draw major conclusions from the study with respect to the existing literature about the implementation of *assessment for learning*. Secondly, implications are drawn from the experience of implementing *assessment for learning*. Thirdly, technology as a tool for reflection is reviewed and implications are drawn. Finally, this chapter ends with suggestions for future research and comments on the method of inquiry.

6.1. Major conclusions from the study

6.1.1 Online journal writing facilitates students' reflection and self-assessment but not for all students.

The findings from the previous chapter show that students were engaged in the process of reflection using online journals. These results are consistent with the previous studies of Garmon (1998), Langer (2002), Spalding and Wilson (2002), Griffin (2003), Schweiker-Marra and her colleagues (2003). Although the current study used different approaches and data collection tools to access students' reflective thinking, it does show that writing journals or blogs can stimulate students to engage in the early stages of reflection. Similar to other studies (Garmon 1998; Griffin 2003; Schweiker-Marra et.al 2003), the level of reflection is not deep enough. This might be due to the time involved in the study, the perception and reception of writing online journals (Langer 2002) and the lack of explicit guidance on what constitutes reflective elements in journals. Similar to other studies, many students find it hard to review and organize their learning experience, either via journal writing, autobiographies or critical incidents. This in turn might explain why not all students exercise self-assessment in the journal. Students in the study were neither given any specific training on the skills of self-assessment nor on reflection. Their engagement in this process might be limited. This study confirms the importance of formally training such skills (Sadler 1998). Further, the requirement of writing an

online journal weekly is another reason why students provided superficial content in journals and had other difficulties. The question is "How frequently should students write reflective journal?"

6.1.2. Communication between tutor and students is facilitated using blogs.

Ray (2006) states that blog has the potential as a tool for communication. The finding of the study shows that the communication between tutor and students is facilitated. Weekly journals enable the tutor to know more about students' learning such as their understanding, their computing background, their interest and expectation on course. This information enabled the tutor to adjust the instruction accordingly. The results from students' perception on the value of blogging also show that students appreciated the feedback given by the tutor. Feedback serves the function of knowledge construction, encouragement and motivation for students to sustain their learning.

6.1.3 Digital portfolios enhance students' reflection provided that they understand the meaning of portfolio construction.

The result of the study shows that about half of the sample in the study engaged in the process of reflection. These students usually had their own objectives in constructing the learning portfolio and the inclusion of a *Second Thought* section. The study confirms the existing study that compiling a portfolio might enhance the reflective thinking. However, there are conditions to be satisfied before the claim can be established. Students are required to understand why and how to construct the portfolio.

6.1.4 Online journal writing has the potential to enhance collaboration among students.

This study finds that writing journals or blogs allows students to share their feelings, ideas and opinions with their classmates. The synthesis of different data such as the ratio of feedback to students, students' perception of the value of peer feedback and students' communication pattern suggests that the majority of students have a positive experience in the online collaborative environment. The collaborative environment offers opportunities for the exchange ideas, construction of knowledge, and can trigger self-reflection, problem solving and can increase motivation for

learning. This finding is similar to other empirical studies listed in chapter 3 section 3.1.1. However, not all students have such experiences because of various reasons like the location of online journal, the practice of writing journals and their perception and reception of online experiences. If students are to experience the above benefits of collaborative environment, work has to be done to arouse students' interest in the practice of collaboration first. The availability of an online tool is insufficient to make students engage in communication.

6.1.5 Students value feedback from both the tutor and their peers.

Similar to existing studies found in the literature (Spalding and Wilson 2002; Garmon 1998), this research confirms the value of feedback to the learning of students. Students value feedback given by both the tutor and their classmates. The function of this feedback supports students in terms of encouragement, empathy, communication and exchange of ideas. This result enriches the literature by the findings that the value of feedback is more on the increase of students' motivation to learn than the knowledge construction in the context of Eastern culture.

6.1.6 Students should be given advice on how to engage in reflective learning.

The quality of student reflection in the second cycle of the study seems to be deeper as compared to that in the first cycle of the study. One explanation is the treatment of training on the reflective journals. The study by Schweiker-Marra et.al (2003) also had the same result when the experimental group had training on a reflective thinking model. Therefore guidance to students in terms of workshops or other training might be a helpful strategy to engage students in the process of reflection.

6.2. Implications for implementation of assessment for learning in Asian culture

This section revisits the effectiveness of using technologies to implement *assessment for learning* in an Asian culture. It also explores the conditions for successful implementation of new approaches to learning and teaching through ICT and assessment. This study confirms that *assessment for learning* can facilitate students' motivation to learn in an Asian culture (James and Pedder 2006). It also verifies the

argument of Elwood (2006) that *assessment* practice should align with the theory of learning. The result of this study is similar to that of Carless (2005) that some of the students practiced self-assessment. The favorable conditions of the *assessment for learning* practice listed below shows the changes in existing classroom practices.

The partial success of the study reveals that some Asian students are quite passive in their learning. It contributes to the literature of the *assessment for learning* in an Asian context. It is clear that the tutor should take an active role in facilitating students in the process of assessment. Even though students are given assessment criteria in advance, they do not consider it before any assessment task. Even though they are provided with opportunities to obtain feedback from the tutor and their peers using blog, their involvement in this aspect was limited to a small number of students. Asian students believe that both the feedback content given by the tutor and their peers increases their motivation in learning. In order to set up a favorable condition for the implementation of *assessment for learning* in Asian cultures, the tutor has to take the first initiative to arouse students engaging in the participatory activity. These might include:

- Allocating a partner to each student who would communicate with them via blog.
- Class time should be organized for students to discuss their work with both the tutor and their peers;
- Discussing the assessment criteria with students;
- Engaging students in the application of assessment criteria in their work;
- Guiding students to read online journals and to write the feedback content.

6.3. Implication for technology as a tool for reflection

As mentioned in chapter three, the online blog environment has the potential to facilitate reflection and communication. Results based on this study seem to support the claim that a blog has the potential to support reflection and communication. Students' attitude towards a blog is quite positive because of its user friendliness and its value as a personal area for sharing. But they are not used to sharing their ideas in a pubic environment. This study shows that the use of technology alone without any

change in pedagogical approach and students' mindset is unlikely to achieve its function of reflection and communication. Even though a blog has the built-in function for one to share and exchange information, there are still some students who did not receive any feedback from others due to various reasons like students' perception of a blog, their personal character and their relationships with classmates. Therefore strategies must be incorporated into the curriculum to ensure that everyone has the partner. This in turn might guarantee they receive feedback from their partner. Tutor should also provide feedback to arouse students in the process of communication. Having the agreement of students, quotations from the content of the blog might be shared in class. They might serve as a reference for other students because the sample in the study had problems writing reflective journals. As with other electronic tools such as email, instant messaging and online discussion groups, a blog is a form of communication using text. It is not easy to achieve mutual understanding among people using a blog. Students should be given guidance on expressing contextual information and presenting salient information to others.

6.4. Reflecting on the research process

6.4.1 Limitations of the study

Role of teacher as a researcher - Even though the researcher had made it clear to students that the grading of their weekly journal has a limited relationship to what they wrote in it, students might still be worried about their marks. Therefore they might provide information which the teacher wants to have.

Study students' view of assessment for learning in detail, using interviews - When interpreting the result of the study, consideration must be given to the quality and reliability of students' responses in their journal. That is the content in journal are those that students choose to reveal. There are thoughts which they do not reveal in the journal that should be considered as well. Therefore, the study would be more robust if students are interviewed about their perception of using blog and the value of the feedback they received.

Students' view on the compilation of learning portfolio - Due to the limited time and resources, students' views on the construction of learning portfolios was not collected in the study. It would be helpful if their views on this topic had been obtained as well. The data might be used to improve the study.

Convenience Sample - The research is conducted in the teacher education program of the University of Macau. The sample of the study is a convenience sample. Even though the results obtained from the study might be hard to generalize to other contexts, the study provides useful data for the tutor to adapt instruction suitable for students. It also provides clear information for those who are interested in the implementation of *assessment for learning* through technology. A replication of the study would be helpful to validate the validity of the study.

6.4.2 Teaching in the action research cycles

The study has been conducted for the three cycles with minor changes in each cycle. In the first pilot cycle, the concept of *assessment for learning* was still very vague in the mind of the researcher. Despite this, the researcher decided to apply this concept in her class using digital portfolios and blogs. Students were required to write a weekly journal of 100-200 words. In the first cycle, changes in teaching occurred mainly in the assessment schemes which required students to compile a learning portfolio and to write a weekly journal. It was believed that these initiatives might facilitate students' reflective thinking. It was found that students had problems in writing weekly journals so questions were given at the end of each lesson for students to think about. Students did not know how to produce a portfolio so a learning portfolio template was given to students. The researcher also faced the problem of students compiling the portfolio very late. Another problem encountered by the researcher was the time required to read and respond to the journal weekly.

In the second cycle of the study, the concept of *assessment for learning* became more concrete for the researcher. The experience gained in the first cycle allowed the researcher to modify her action plan accordingly. Assessment criteria were given to students with explanation in the first lesson. A portfolio template was given to students early. A course review lesson was organized in the middle of the course.

Students were encouraged to submit their working portfolio in advance. As for the weekly journal, reflective questions were given for the first few lesson of the course. The minimum word requirement of a journal entry was set to 50. An assessment requirement of providing feedback to classmates was set up. Students' opinion about the tutor's teaching style was changed in the next lesson. It was found that students had problems in writing reflective journals.

There were not many changes in the third cycle of the action research. Since previous students' journals had been analyzed, students in the third cycle were introduced to the purpose of writing reflective journals. Illustrations of reflective journals and descriptive journals were given. The tutor put more emphasis on the amount and the quality of feedback to students. Reflective questions about the value of comments given by the tutor and the peers were amended in the learning portfolio. The systematic analysis of the data collected from multiple sources was conducted after the third cycle. The next section elaborates work that might be done in the next cycle of the action research.

6.4.3 Suggestions for future work

With reference to the findings and the limitations of the study, the implementation of *assessment for learning* through technology can be enhanced in future studies as follows:

- Participants in the study reported the problem of writing weekly journal. The question of how much blogging is enough to get reflection going is interesting. How many journal entries should students write? Which ways should the tutor use to encourage students in blogging others' journals?
- Communication in blogs can generate problems of misunderstanding. The next cycle of the action research might implement a few initiatives to tackle this problem. For instance, students should be informed about the problems of communication through text. Guidance might be given to students on how to transmit messages clearly. Encouraging students to discuss knowledge through blog is another way.
- Another approach to further this study is to modify this exploratory study by

focusing on one or two specific techniques of *assessment for learning* with specific features of a blog. The blog environment has the potential to support collaboration and reflection. Therefore emphasis might be on the collaboration among students in terms of constructive feedback. The research in the area of feedback is still limited (Higgins, Hartley et al. 2001). Research in the area of feedback with the help of technology deserves further study. Experience gained from current studies shed light on the need for training about the provision of feedback and students' self-assessment issues.

- This study has been done for two semesters in computer related courses. However, the development of reflective thinking takes quite a long time. Therefore it would be better if a longitudinal study could be conducted in other courses. Students' development can be collected and analyzed again with the help of technology. Meanwhile conducting the same study in other courses involves other teachers. This implies that the limitation of teacher as researcher can be solved. Involvement of other teacher educators might promote collaboration among teacher educators which in turns affects the size and the impacts of the research.
- The self-assessment technique for the purpose of *assessment for learning* might also be implemented with digital portfolios. As shown in the study a digital portfolio which does not require high level of students' technical knowledge seems to support self-assessment. Therefore research in the area of *assessment for learning* and digital portfolio deserves further investigation.

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List of Appendices

Appendix A. Objectives and course outlines of the three technology courses

Course: Computer Application

After the completion of the course, students are expected to

- gain proficiency in the operations of certain software like Office tools, Inspirations and Flash;
- gain insights of the application of these tools;
- Develop reflective practice in learning.

Course Outlines

1. Introduction
2. Word processing
3. Spreadsheet
4. Presentation Software
5. Inspiration (1)
6. Inspiration (2)
7. Course review
8. Midterm assessment
9. Test review and Inspiration
10. Flash 1
11. Flash 2
12. Flash 3
13. Flash 4
14. Final assessment

Course: Information Technology Education

After the completion of the course, students are expected to

- Aware of issues related to Information technology
- Gain insights on the use of IT in teaching and learning
- Develop reflective practice in learning
- Strength the confidence in using technology
- Apply new mindset to face Information technology

Course Outline

1. Course Overview and introduction to blog
2. Introduction to IT in education
3. IT education in Macau
4. IT education in nearby regions
5. Influences of IT in education
6. Field Trip
7. Review on the field trip and course review
8. Theory of IT in education
9. IT as a tool for learning
10. IT as a tool for teaching
11. Webquest
12. Trends of IT in education
13. Conclusion

Course: Educational Technology

After the completion of the course, students are expected to

- Define the meaning of education technology and its scope
- Aware of theories underlying the field of educational technology
- Apply these theories and learning resources in teaching
- Aware of the characteristics of different learning resources
- Produce and manage learning resources

Course Outline

1. Course overview
2. Field Trip
3. Introduction to educational technology
4. Theories underlying educational technology & Educational media
5. Interactive media
6. Visual media
7. Audio resources
8. Assessment 1
9. Video resources (1)
10. Video resources (2)
11. Video resources (3)
12. ASSURE model
13. Assessment 2
14. Presentation

Appendix B. Student computing background questionnaire

1. Student ID：_____ Name of the high school graduated: _____
2. You learnt computer _____ years ago.

☐1-2 years ☐3-5 years ☐6-9 years ☐10-12years

3. You have_____ years of experience in using computers.

☐1-2 years ☐3-5 years ☐6-9 years ☐10-12years

4. Your purposes of using computer are: (multiple selections)

☐Seeking information ☐Entertainment ☐Making friends ☐Learning

☐Communication ☐Teaching ☐Others (Please specific)_____

5. Your degree of interest in computer:

☐Highly interested ☐Interested ☐Neutral ☐Not so interested ☐Uninterested

Why?

_____

6. Your degree of familiarity in computer:

☐Highly familiar ☐Familiar ☐Neutral ☐Not so familiar ☐Unfamiliar

7. Your computer capability

		Highly familiar	Familiar	Neutral	Not so familiar	Unfamiliar
a.	Basic computer operations	☐	☐	☐	☐	☐
b.	Chinese Input	☐	☐	☐	☐	☐
c.	Application of word processing software (Word)	☐	☐	☐	☐	☐
d.	Application of spreadsheet software (Excel)	☐	☐	☐	☐	☐
e.	Application of presentation software (PowerPoint)	☐	☐	☐	☐	☐
f.	Application of database software (Access)	☐	☐	☐	☐	☐
g.	Web surfing and information seeking (I.E.)	☐	☐	☐	☐	☐
h.	Installation and uses of educational software	☐	☐	☐	☐	☐
i.	Web pages authoring (Frontpage, DreamWeaver)	☐	☐	☐	☐	☐
j.	Sound processing (Sound Editor)	☐	☐	☐	☐	☐
k.	Image processing (PhotoImpact, PhotoShop)	☐	☐	☐	☐	☐
l.	Produce animation (Flash)	☐	☐	☐	☐	☐
m.	Video editing (Movie Maker, Premiere)	☐	☐	☐	☐	☐
n.	Multimedia production (Authorware)	☐	☐	☐	☐	☐
o.	Application of email	☐	☐	☐	☐	☐
p.	Application of discussion group	☐	☐	☐	☐	☐
q.	Application of blogs	☐	☐	☐	☐	☐
r.	Application of online learning systems (WebCT, BlackBoard)	☐	☐	☐	☐	☐
s.	Online chat (ICQ, MSN)	☐	☐	☐	☐	☐
t.	Programming (Visual Basic, Visual C, Pascal)	☐	☐	☐	☐	☐

8. You teach in _____ school.
9. Years of Teaching：
☐Less than 2 years ☐2 - 5 years ☐More than 5 - 10 years
☐More than 10- 15 years ☐More than 15- 20 year ☐More than 20 years

10. Classes that you teach in this semester：(Multiple selection)
☐Kindergarten 1 ☐Kindergarten 2 ☐Kindergarten 3
☐Primary 1 ☐Primary 2 ☐Primary 3 ☐Primary 4 ☐Primary 5 ☐Primary 6
Others _____

11. Subjects that you teach in this semester：(Multiple selection)
☐Chinese ☐English ☐Mathematics ☐Computer ☐Integrated Science
☐Music ☐Arts ☐Physical Ed. ☐Religion ☐Integrated curriculum
☐Others _____

12. What is the ratio of teacher to computer in your school?
☐1:1 ☐2:1 ☐3:1 ☐4:1 ☐5:1 ☐above 6:1
13. Is the integration of IT in education a school policy?
☐Yes ☐No
14. Is the computer facilities in your school sufficient?
☐Very sufficient ☐Sufficient ☐Neutral ☐Not sufficient ☐Rare
15. Is the hardware provision of the school in general sufficient?
☐Very sufficient ☐Sufficient ☐Neutral ☐Not sufficient ☐Rare
16. Is the Internet bandwidth of your school sufficient?
☐Very sufficient ☐Sufficient ☐Neutral ☐not sufficient ☐Rare
17. Is the technical support of your school sufficient?
☐Very sufficient ☐sufficient ☐Neutral ☐not sufficient ☐Rare
18. Have you ever applied IT in the following subjects? (Multiple selection)
☐Chinese ☐English ☐Mathematics ☐Computer ☐Integrated Science
☐Music ☐Arts ☐Physical Ed. ☐Religion ☐Integrated curriculum
☐Others _____
19. Is the software provided by the publisher helpful to your teaching?
☐Very helpful ☐Helpful ☐Neutral ☐Unhelpful ☐Very unhelpful
20. In what ways do you think IT facilitates teaching and learning?

Thank you!

Appendix C. Course review questionnaire

Course review questionnaire 2005/10/19

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The content in the course satisfies your expectation.					
2. I am clearly aware of the course requirement.					
3. I am clearly aware of the lesson journal requirement.					
4. I am clearly aware of the group assignment requirement.					
5. I am clearly aware of the learning portfolio requirement.					
6. I am clearly aware of the test/examination requirement.					
7. I agree that these four types of assessment are adequate.					
8. I am satisfied with the content of previous 6 lessons.					
9. I am satisfied with the teaching approach of the previous 6 lessons.					
10. I agree that those topics are useful to me.					
11. I agree that knowledge learnt in classes can be applied in teaching or learning					

12. Which problems do you encounter in the last 6 lesson?

13. What will you suggest for the coming 7 lessons?

14. Do you have further opinions about the course?

15. What is your opinion about this questionnaire?

♥ ♥ ♥Thanks for your suggestions in the design of the course ♥ ♥ ♥!

Appendix D. Blog questionnaire

1. Are you familiar with computer applications?

☐very familiar ☐ familiar ☐neutral ☐unfamiliar ☐very unfamiliar

2. Is it easy to use the online journal provided by www.qoos.com ?

☐very easy ☐easy ☐neutral ☐difficult ☐very difficult

3. Do you prefer to express your opinions about this course through online journal?

☐highly like ☐like ☐neutral ☐dislike ☐highly dislike

4. Do you prefer to express yourself through online journal?

☐highly like ☐like ☐neutral ☐dislike ☐ highly dislike

5. Do you frequently read your online journals?

☐2-3 times/week ☐weekly ☐1 times/every 2-3 weeks ☐never

6. Do you frequently read your peers' online journals?

☐2-3 times/week ☐weekly ☐1 times/every 2-3 weeks ☐never

7. Do you expect your classmates' feedback on your online journals?

☐highly expected ☐expected ☐neutral ☐weakly expected ☐not expected

8. Do you expect your tutor's feedback on your online journals?

☐highly expected ☐expected ☐neutral ☐weakly expected ☐ not expected

9. You agree that online journal is a communication channel with your tutor.

☐strongly agree ☐agree ☐neutral ☐disagree ☐strongly disagree

10. You agree that online journal is a communication channel with your peer.

☐strongly agree ☐agree ☐neutral ☐disagree ☐ strongly disagree

11. You agree that online journal facilitates your learning of this course.

☐strongly agree ☐agree ☐neutral ☐disagree ☐ strongly disagree

12. What are the problems encountered when you write online journals?

---

13. What are the uses of the online journal to you?

The end.

Appendix E. Learning portfolio template

Chan's Learning portfolio of
IT in education course

Objectives

- For me to organize my learning experience and products
- For me to review the course content

Content

- Objectives
- Weekly journal and class exercises
- Reflective questions

Weekly journal

- Lesson 1
- Lesson 2
- Lesson 3
- ...
- Lesson 7
- Lesson 8
- Lesson 9
- ...
- Lesson 13

Lesson 1

- Although this is the 1st lesson, I understand what I am going to learn in this course. At first, I think it is about the production of teaching tools. (e.g. big diagrams, 3D-signs) I learn that educational technology is about the application of current technology (e.g. computer) to enhance education (instruction). It is hope that instruction is more explicit through functions provided by technology so as to ease people understand the taught topic and content.
- These technologies would be helpful especially to children because they have little experience on environments. If teacher uses picture and words to teach children, I believe they don't have much interest in it. However, I believe they will have more interests in the dynamic teaching materials made by educational technology.

Lesson 1

- Class exercise
- Second thought → This is the first lesson. Regina teaches us how to use online journal. It also broadens my view with this website because there are lots of interest contents. I also have a chance to view classmates' journals.

Reflective questions

- Is there any interesting experience in the course?
- What do you gain from the course?
- What is the major problem that you have in the course?
- How do you address the problem?
- List areas which you can do better in the course.
- Do you consider the feedback given by classmates helpful to your learning? Why?
- Do you consider the feedback given by the tutor helpful to your learning? Why?

Appendix F. Consent form

A study of assessment for learning using information technology

Dear students,

I am conducting a study of assessment for learning using information technology. The purpose of the study is to explore how the technology might facilitate students' learning. It will be grateful if you allow me to analyze your learning portfolio. During the process of data analysis, your identity will be deleted to achieve anonymity. In order to understand the data correctly, I would like to conduct an interview. Your participation is highly appreciated.

Thanks for your cooperation.

Regards,
Chan Kan Kan

Reply

A study of assessment for learning using information technology

- I agree / disagree Chan Kan Kan to analyze my learning portfolio for the above study.
- I agree / disagree to accept the interview of the above study conducted by Chan Kan Kan.

Student Name: _____